

European Good Hygiene Practices Guide

for the collection, storage, trading and transport of cereals, oilseeds and protein crops

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1. INTRODUCTION

Placing on the market safe food and feed products is first and foremost a question of good management practices at each stage of the feed and food chain from primary production to final processing. It is therefore the responsibility of each operator in the feed and food chain to implement good practices to ensure the safety of the goods he handles. Regulation (EC) No 1831/2003 on feed hygiene as well as Regulation (EC) No 853/2004, on the hygiene of foodstuffs acknowledge the positive contribution of good hygiene practices to achieve the objectives laid down in the EU food and feed safety legislation and encourages the development of national or Community guides to good practice by food and feed business sectors, in consultation with any interested party.

In correlation with the development of the European food and feed legislation which mainly focused on food safety objectives, COCERAL and COGECA formed a special working group, called GTP Working Group, who developed the European Good Hygiene practice guide for the collection, storage, trading and transport of cereals, oilseeds and protein crops as a reference document, to help ensuring the compliance with the European hygiene standards, to control food and feed safety risks and to guarantee the safety of the food and feed placed on the market. The guide also helps the operators meeting the requirements of the buyers. In this framework, COCERAL and COGECA did not forget the guidance document on the implementation of the General Food Law approved by the Standing Committee on the Food Chain and Animal Health at its meeting of 20 December 2004 which must be regarded as an essential document that operators should refer to for compliance with the General Food Law Principles.

This guide has been developed in consultation with a large representation of sectors linked with production and consumption of food and feed materials and other stakeholders throughout the Community. As Member of the European Feed Ingredients Platform (EFIP) COCERAL has been regularly exchanging on the content as well as on the progress of the guide with EFIP Members formed by the European associations or federations representing the sectors that supply feed materials to the EU market, meeting voluntarily to evaluate sectors guides, share experiences, cooperate and offer concerted guidance to all of their members on the implementation of the Feed Hygiene Regulation and relating safety schemes. Together, the EFIP members represent the vast majority of all "materials" that enter the food chain via compound feed (cereals, processed vegetable or animal products, additives, and co-products from the food processing industry)

The Guide aims to prevent or reduce the risks of biological, chemical and physical contamination that were identified in the hazard analysis, adapted by each operator according to the activities they control. The operators handle cereals, oilseeds and protein crops. They need to identify whether some of their outlets have specific requirements in respect of some identified hazards and, if necessary, increase their vigilance on the prevention of cross-contamination.

The Guide, **to be applied voluntarily**, constitutes a progress tool supporting collection, storage, trading and transport operators in the day-to-day management of the food and feed safety; it was written **by** and **for** collection, storage and trade professionals, in collaboration with the other parties concerned (partners of the industry, control administrations etc.) to help them to:

- Comply with good hygiene practices relating to operating sites, premises, equipment, transport, waste and staff.
- Identify risks which have a decisive influence on the consumer's safety and establish appropriate procedures for controlling them based on the principles of the H.A.C.C.P. system (hazard analysis, critical control points).

The Guide was built around 4 complementary and autonomous modules allowing us to identify the covered activities carried out by one or more operators themselves or by a sub-contractor:

- Trading
- Collection

- Storage (In owned storage facilities)
- Dispatch / delivery including road, river, sea or rail transport

When the guide is applied, the operators must **internally revalidate** their own measures in the light of the guide's recommendations and the regulatory requirements. This guide should form a basis for creating internal rules for each company but it should not be a substitute for the operator's own thinking regarding its own specific characteristics and should be adapted to them. Furthermore, the professionals can choose methods other than those proposed, although they are responsible for proving their effectiveness.

The public authorities acknowledge the existence of good hygiene practices relating to a given profession when performing their official controls. The operators can therefore **refer** to the good hygiene practices guide to explain the measures they take on the related level.

The Guide constitutes a help tool for **staff training** and for raising the awareness of suppliers (farmers, service providers etc.) and it can be used as a complementary food and feed safety tool in addition to the implementation of an ISO 9001, ISO 22000 etc. type quality management system. On the initiative of COCERAL and COGECA, the Guide is periodically updated to take into account the developments in scientific, technical, regulatory and standards data. Operators must, however, take into account any regulations subsequent to the date on which the guide is written, without waiting for it to be updated. COCERAL and COGECA perform routine regulatory monitoring helping the operators in the above mentioned task.

Revisions of the Guide may also be initiated by COCERAL and COGECA on request of the European Commission or Members States within the Standing Committee of the Food Chain and Animal Health (as per Article 9(4) of Regulation (EC) No 852/2004 and Article 22(5) of Regulation (EC) No 1831/2003. The successive revisions will then be proposed to the Community authorities concerned with a view to their official validation.

The guide may be used as a starting point to develop national or regional guides which might be more detailed but should not be in contradiction with this Community guide. If Member States and or operators have already implemented higher standards and are applying them, the guide should never be used to lower the level of these standards.

1.1 Collection, storage and trade of grains and seeds in Europe

The EU-27 produces on average some 300 mio t cereals, 16 mio t oilseeds and 2.5 mio t protein crops. Moreover the EU imports some 10-15 mio t cereals, 15 mio t oilseeds and 35 mio t feedstuffs. Over 20 mio t of grains are exported to third countries. The marketing of this production as well as imports and exports are done by the members of COCERAL and COGECA.

COCERAL is the voice representing the European cereals, rice, feedstuffs, oilseeds, olive oil, oils and fats and agrosupply trade. The members of COCERAL are the national trade organisations of most of the EU-27 Member States, who for their part represent collectors, distributors, exporters, importers and agribulk storers of the above mentioned commodities. The members are composed of essentially private traders and in some countries also farmers' cooperatives. Furthermore, COCERAL has associate members in Switzerland.

COGECA, the EU agri cooperatives, currently represents the general and specific interests of some 40,000 agri' cooperatives employing some 660,000 people and with a global annual turnover in excess of three hundred billion euros throughout the enlarged Europe. Since its creation, COGECA has been recognised by the European Institutions as the main representative body and indeed the spokesman for the entire agricultural and fisheries cooperative sector.

2. SCOPE and DEFINITIONS

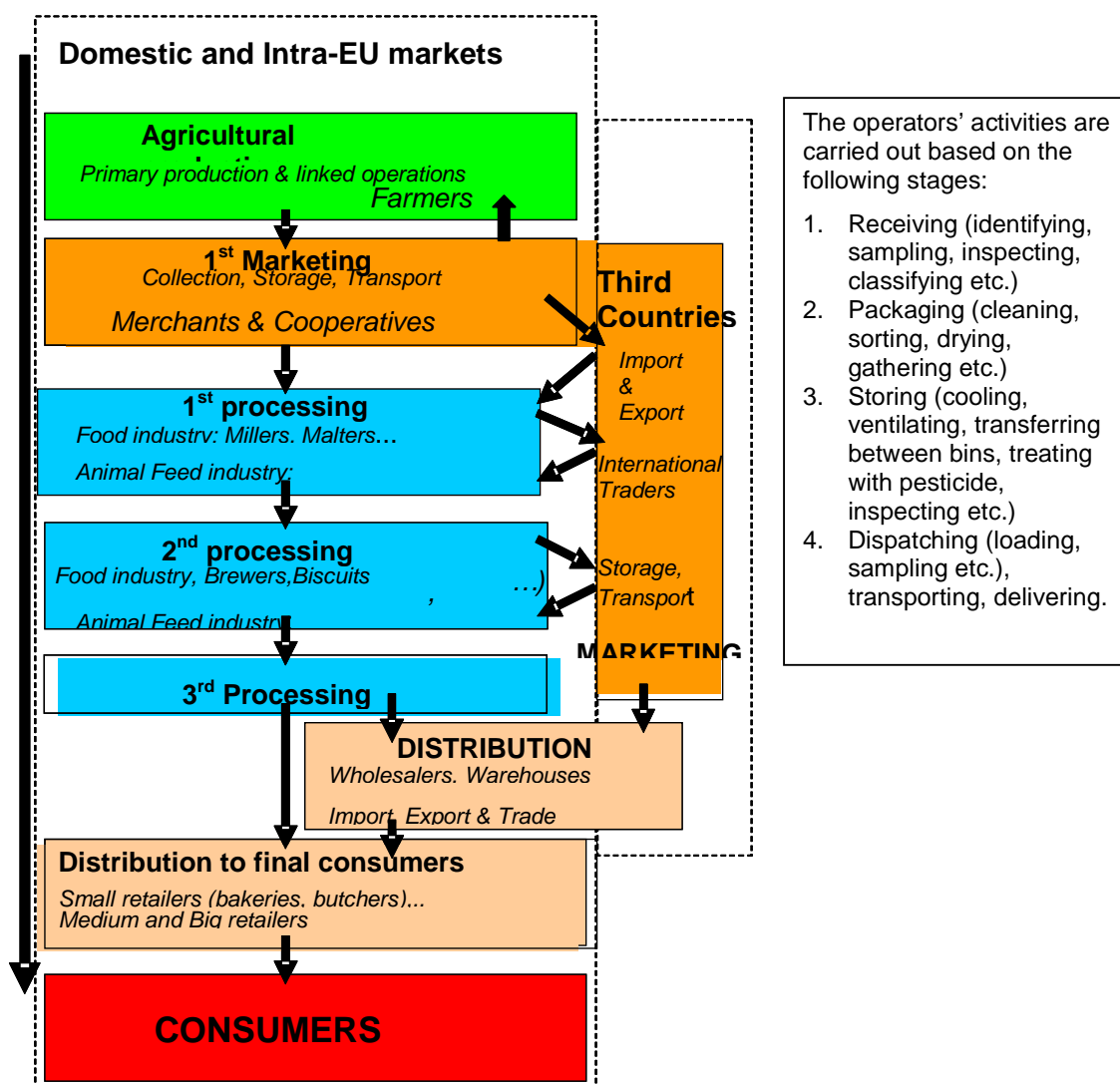
2.1. Scope

The present European Good Hygiene practice guide for the collection, storage, trading and transport of cereals, oilseeds and protein crops (hereafter referred to as the Guide) proposes good hygiene practices for operators that collect, store, trade and transport cereals, oilseeds, protein crops and other plant products, alone or in mixtures, as well as their by-products. The Guide is applicable to all operations from receipt through to dispatch of the above mentioned goods and it covers all food and feed operators in Europe carrying out the mentioned activities included within its scope, namely any first-stage trading operator on the domestic or intra-Community market as well as trading with third countries.

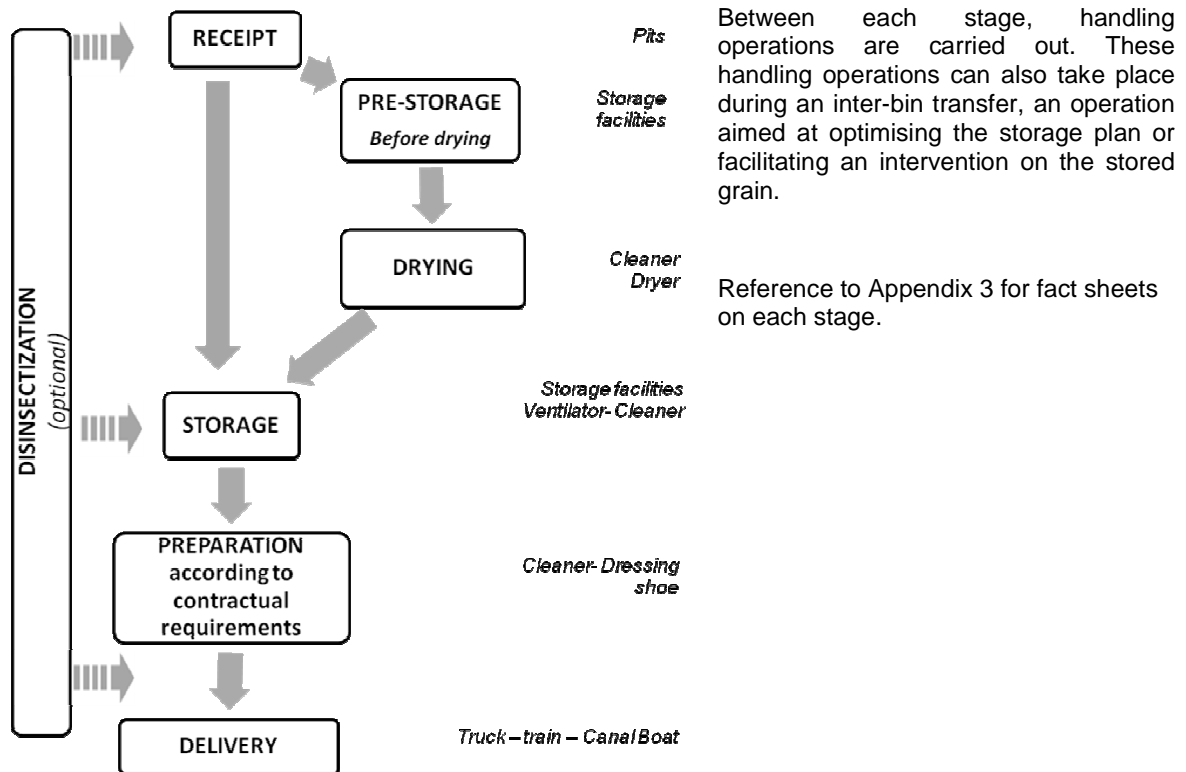
The Guide is not applicable to farmers with own storage facilities as their activities are subject to the primary production guide and related activities. Nevertheless, farmers with storage facilities are welcome to voluntarily apply the good hygiene practices described in the present guide.

The Guide does not cover the commercial characteristics of the products as they are an integral part of the contractual provisions.

2.1.1. Trade operators in the food and feed-processing industry



All of the technical processes are developed with a view to trading the goods.



2.2. Legal definitions

Batch: an identifiable quantity of food and feed determined to have common characteristics, such as origin, variety, type of packaging, packer, consignor or labelling, and, in the case of a production process, a unit of production from a single plant using uniform production parameters or a number of such units, when produced in continuous order and stored together (Regulation (EC) No 1774/2002 and Regulation (EC) No.767/2009)

Feed (or feedingstuff): Means any substance or product, including additives, whether processed, partially processed or unprocessed, intended to be used for oral feeding to animals (Regulation (EC) No 178/2002).

Food (or foodstuff) : Any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans (Regulation (EC) No 178/2002).

Feed hygiene: Means the measures and conditions necessary to control hazards and to ensure fitness for animal consumption of a feed, taking into account its intended use (Regulation (EC) No 183/2005).

Food Hygiene: Means the measures and conditions necessary to control hazards and to ensure fitness for animal consumption of a feed, taking into account its intended use (Regulation (EC) No.852/2004)

Feed material: means products of vegetable or animal origin, whose principal purpose is to meet animals' nutritional needs, in their natural state, fresh or preserved, and products derived from the industrial processing thereof, and organic or inorganic substances, whether or not containing feed additives, which are intended for use in oral animal-feeding either directly as such, or after processing, or in the preparation of compound feed, or as carrier of premixtures (Regulation (EC) No 178/2002 and Regulation No. 767/2009);.

Hazard: Biological, chemical or physical agent in, or condition of, feed with the potential to cause an adverse health effect (Regulation (EC) No 178/2002).

Operator (food/feed): means the natural or legal persons responsible for ensuring that the requirements of food and feed law are met within the food and feed business under their control (Regulation (EC) No 178/2002 and Regulation (EC) No.183/2005).

Risk: A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard (Regulation (EC) No 178/2002).

Traceability: Ability to trace and follow a feed or substance intended to be, or expected to be incorporated into a feed, through all stages of production, processing and distribution (Regulation (EC) No 178/2002).

Undesirable substances: Any substance or product, with the exception of pathogenic agents, which is present in and/or on the product intended for animal feed and which presents a potential danger to animal or human health or to the environment or could adversely affect livestock production (Directive 2002/32/EC).

2.2.1 Other definitions

Aflatoxins Mycotoxins produced by *Aspergillus* species of Fungi, mainly *A. Flavus*, *A. Parasiticus* and *A. Nomius*.

Aspergillus Very common type of mould, the control of which is of great sanitary and economic importance to the food-processing industries. Several species are toxigenic.

Bin Individualized grain storage unit of varying capacity, in which cereals and oilseeds are stored.

Bringing into line with contractual standards: Preparation of the grains according to the contractual specifications (assembly, grading, cleaning).

Calibration Operation used to check that a measuring device indicates a precise value via an appropriate procedure.

Collection (as used in this guide): Receiving section of the raw material.

Control point: Point, stage or procedure which ensures the hygienic control of a process.

C.C.P. (critical control point) in accordance with standard XP V 01-002: Stage at which a control measure can be applied and where it is essential to prevent or eliminate a hazard jeopardizing the safety of foods or bring the safety to an acceptable level.

Cleaning Operation which aims to remove various impurities (husks, straw, soil etc.) which have a negative effect on the grains' storage life. The cleaners work on the principles of suction and/or grading (gratings).

Corrective actions: Actions to be carried out when the results of the monitoring applied to the C.C.P. indicate a loss of control.

Contaminant: Any biological or chemical agent, any foreign matter or any other substance which is not intentionally added to a product which could compromise its safety or healthiness

Contamination/Cross-contamination: The undesired introduction of impurities of a chemical or microbiological nature or foreign matter during production, sampling, packaging or repackaging, storage or transport.

Critical limit (or critical threshold) Criteria which distinguishes acceptability from non-acceptability

Control measures (or preventive measures): Actions or activities which can be implemented to prevent or eliminate a hazard which jeopardizes the safety of foods and feed or bring it to an acceptable level.

Dust mark Mark (cross or disc for example) painted on the floor (contrasting with the colour of the floor) to assess the presence of dust.

FIFO (First In First Out): Stock management method in which the first article entering the stock is the first to leave.

Flat bottom storage (or flat bottom box) Stock of grains the floor dimensions of which are larger than the height.

Flow meter Device used to measure the flow of a product to be nebulized or sprayed.

Food and feed safetyiness of foods (standard NF V01-002) Assurance that the foods are fit for human consumption when they are consumed in accordance with their intended use.

Safety of foods Assurance that the foods will not harm the consumer when they are prepared and/or consumed in accordance with their intended use.

Grading Mechanical operation which sorts through a given species to ensure compliance with the customer's specifications (example: grading of brewing barley).

H.A.C.C.P. (Hazard Analysis Critical Control Points): System which identifies evaluates and controls significant food and feed safety hazards

Hazard analysis: Measure consisting in gathering and assessing the data on hazards and the conditions that lead to their presence to decide which of them are significant in terms of food and feed safety and should therefore be taken into account in the H.A.C.C.P. plan.

H.A.C.C.P. plan: Document prepared in compliance with the H.A.C.C.P. principles to control significant food and feed safety hazards in the food industry segment considered.

Handling equipment System used for mechanically or pneumatically moving the grain in bulk.

Hopper Small capacity bin in which goods are stored for a short time.

Inter-bin transfer Operation which consists of transferring a mass of grains from one bin to another, for example to homogenize them or to prevent solidification.

Pesticide treatment Operation which consists of applying pesticides in solid, liquid or gas form on grains or onto the silo walls.

Ishikawa diagram [the five words below begin with M in French]: Mnemonic method used in order to be thorough in research. For each stage in the silo diagram, the team asks itself the question: "Does a hazard stem from the **R**aw material entering the stage, the **E**quipment used for the stage, the **L**abour used in this stage, the **E**nvironment (working environment) or the **M**ethod (of working)?"

Maintenance: Maintenance consists in keeping a tool in working order so that it can carry out the service for which it was designed. Two types of maintenance are practised: corrective, which consists in repairing as required, and preventive which is planned, scheduled.

Maize drying shed Maize stored outside in units covered with wire meshing and slowly dried by the ambient air.

Mycotoxins: Toxic metabolites produced by certain species of mould which are dangerous to humans and to animals that consume the food and feed on which this mould has developed.

Monitoring: Action which involves carrying out a scheduled series of observations or control parameter measurements to assess whether a C.C.P. is controlled.

Nebulization process consisting of coating the moving grain with an extremely fine mist, it ensures the pesticide treatment is applied more consistently than with spraying of an environment.

Operating method: Specified method for carrying out a task

pH (hydrogen potential): Unit between 1 and 14 characterizing the acidity (< 7) or alkalinity (> 7)

Pathogenic: Something which causes diseases.

Pests: Birds, rodents, insects and other animals able to directly or indirectly contaminate foodstuffs and feedstuffs.

Pit: Receipt equipment in which the grain falls by gravity.

Procedure: Specified method of carrying out an activity or process.

Raw material: Basic substance in its natural, modified, or semi-processed state, used as an input to a production process for subsequent modification or transformation into a finished good.

Record: Document recording results obtained or providing evidence that an activity has been carried out.

Smell Abnormal odour (other than the grain's normal odour).

Specifications: Informative or contractual document between the supplier and the customer which determines the quality objectives of a product or service and criteria for assessing this quality (hygiene requirements etc.).

Silo thermometry System used to measure the temperature in the mass of a bin using sensors.

Sorting Mechanical operation which sorts between two different species (example: sorting of a batch of wheat containing rape).

Thermodynamic activity of water (Aw): Concept introduced in 1936 by Lewis who talked of the "Activity of Water" (hence the universally used abbreviation Aw). It concerns the water available in foodstuffs for microorganisms. The activity of pure water is equal to 1.

Verification: Application of methods, procedures, analyses and other evaluations in addition to those used for monitoring, to determine whether the H.A.C.C.P. plan is complied with.

Ventilation Operation aimed at cooling the grain and maintaining it at a sufficiently low temperature to ensure its good storage. Ventilation is carried out via the forced circulation of the ambient air towards a mass of cereals (the air is forced or extracted using a ventilator, sent to the grain via pipes, then distributed in the mass by a distribution shaft system).

2.3. The regulatory requirements

The European Union has revised all of its food and feed legislation to implement a single, transparent hygiene policy applicable to foodstuffs as well as feedstuffs and all food and feed business operators.

The good practices set out in this guide originate from the application of the HACCP method and meet the requirements of the “food and feed hygiene regulations”. The main regulations taken into account in the drafting of this guide are listed in Appendix 7.

SECTION I

GOOD HYGIENE PRACTICE RECOMMENDATIONS FOR COLLECTION, STORAGE,
TRADING AND/OR TRANSPORT OPERATORS*Chapter I**General good hygiene practices***1. The premises*****Sanitary facilities and staff rooms***

- Make sanitary facilities available to staff, equipped with a sink and toilets supplied with running water and keep them well cleaned.
- Make changing rooms or private closets available to staff so they can change their clothes.

Lighting

- Light the premises appropriately.
- Avoid any contamination by pieces of broken glass by using safety lamps or sealed diffusers.

Water

- Non-drinking water, used for example for fire fighting must be distributed in a separate pipeline system.

2. Monitoring plan

The operator should implement a plan for monitoring the main hazards that affect its activity. This plan aims to:

1. Confirm the relevance of the hazard analysis,
2. Verify the effectiveness of the control measures put in place,
3. Ensure that the goods being marketed are compliant with the regulations,
4. Initiate improvement actions appropriate to the detected or potential anomalies.

The plan should be adapted to the products collected, the outlets and the operator's general organization. This plan first of all aims to monitor the main hazards in the main marketed productions concerned (chemical, physical, biological harmful substances, pathogenic flora, mycotoxins, unauthorised GMOs, etc.). Depending on the operator's situation, it may be completed by analyses on heavy metals, dioxins, pesticides and pathogenic microorganisms etc.

2.1 Sampling

The operator may define its own sampling method. In order to do so, it can use the standards in force.

2.2 Analysis

The monitoring plan can be individual that is, performed by the operator who is the only person who will make use of the results. In order to gather a larger number of samples and have a more exhaustive view, operators can become part of networks which propose food and feed safety monitoring plans for cereals and oilseeds.

2.3 Records and documentation

To create its individual monitoring plan, the operator can include the following elements:

- The number of sites and bins,
- The volume collected,
- The contaminant/product pair,
- The origin of the product (barn storage, field, silo etc.),
- The effect of the time of year (climatic conditions),
- The geographical area,
- The historical data,
- The destination – customer requirements etc.
- The sampling and analysis method used.
- if relevant and upon the case, a reference to local, national, and community legislation.

3. Staff

All provisions are developed in compliance with the safety rules defined by the operator.

The staff dealing with the operations are trained and kept regularly informed of the internal management and recording procedures, developments in rules as well as the commercial uses. Furthermore, if appropriate, the staff dealing with operation is trained on the legislation concerning the contaminant thresholds the pesticide treatment, the cleaning procedures and, more generally, on the Good Hygiene Practices (GHP), Good Managing Practices (GMP) , traceability sampling and analysis rules.

Specific training and specific administrative management and technical intervention procedures are developed when the company deals with goods with specific regulations.

3.1. **Hygiene awareness raising**

- Ensure that all staff is made aware of hygiene issues, including temporary or recently recruited staff, and maintenance or transport staff, and provide regular refresher courses on the subject.
- Make staff, including seasonal staff, aware of human-induced contaminations to help them understand hygiene rules and facilitate their compliance: particularly in terms of cleaning the pits, dosing pesticide products and washing hands.
- Train the staff responsible for developing and maintaining the HACCP system or implementing this guide with the operator.

3.2. **Behaviour at work**

- In the work place, make instructions relating to compliance with the present guide available to staff by the most appropriate means, for example signs, internal notes, notices etc.
- Put in place maintenance instructions for internal and external services, stating the need for systematic cleaning after maintenance work.
- Ban smoking in product handling and storage areas and remind staff of this obligation with signs or instructions.
- Make staff aware of the problems that could be caused by internal maintenance work, such as foreign bodies, and of the cross contamination that could occur with chemical products or seeds, such as a leak of pesticide products or the non-detection of treated seeds on receipt.
- Make staff aware of the need to comply with any necessary waiting times after goods or containers (bin, transport receptacle) have been treated with pesticides.

3.3. **External companies and visitors**

- Inform them of the fundamental hygiene rules in place within the operator's company and ensure they are adhered to at the operating site.

Staff: examples of controls and records

- Records of training, certificates.
- Seasonal workers' welcome guide.
- Specifications with external operators.
- Cleanliness/hygiene audit.

Chapter II

Good practice recommendations for trading operations

1. The domain

The commercial activity mainly concerns the purchase of cereals, oilseeds, protein crops and potentially other soil-grown products, alone or in mixtures, and their by-products from agricultural producers and first-processing industries and their sale on the wholesale market.

The activity is carried out with farmers, first-processing industries from the grain industry and trade intermediaries, export or not, for human food, animal feed and other industrial uses, within the European Union and to third countries.

2. Registration of the operators

The operator must be duly registered with the relevant national authorities for each of its sites, for its activities in the human food sector (regulation (EC) No. 852/2003) and the animal food sector (regulation (EC) No. 183/2005).

3. Traceability

Traceability in itself does not ensure food and feed safety; it must be perceived as a tool or risk management instrument to be used to contain a food and feed safety problem more easily. Consequently, traceability must allow the food and feed business operators as well as the competent authorities to proceed with precise and targeted withdrawals and recalls, in accordance with Regulation No.178/2002..

When the operator purchases crop raw materials or from the market, even when there is no physical transit through its facilities, it must ensure that its suppliers' dispatch sites are registered.

For both purchases and sales, the transactions are carried out at the operator stage in compliance with the commercial uses, good hygiene practices and food and feed safety regulations, as well as current European and national traceability rules.

The obligations for operators are:

- They must be able to identify their suppliers and customers;
- They must have systems and procedures allowing this information to be made available to the competent authorities on request;
- They must label or identify appropriately the food or feed placed on the market, to facilitate its traceability.

The administrative traceability records must indicate:

- The name and address of the seller and the buyer
- The point of loading and unloading of the products
- The marketing name of the feed and/or the name of the food, the batch or lot number as well as its quantity;
- Identification of the transport company and the means of transport used, such as boats (in hold or tank), vehicles (with reference to trailer), etc.
- Identification of the storage company and the means of storage used, such as warehouse, silo or tank

The duration for which the transport documents have to be kept was set to a minimum of 3 years depending on national legislation.

4. Recording of movements

The appointed staff apply a stock movement recording procedure (receipts and dispatches, including inter-silo transfers) adapted to each site, for which they have been trained. This serves as a basis for managing the stocks and enables the computer transfer or gathering of the information required for invoicing and, more generally, account and declaration management.

5. Labelling and accompanying documents

Each goods movement recorded by the operator is materialized by the creation of supporting documents (receipt, transfer, delivery notes) issued in as many copies as there are counterparties. These documents are drawn up in accordance with the regulations regarding the labelling of foodstuffs/feedstuffs and transport.

The notes indicate:

- The marketing name of the feed and/or the name of the food, the batch or lot number if available as well as the weight loaded;
- The names and addresses of the delivery people and the customers or consignees, the date and full address of the dispatch and delivery location (otherwise customer name), the type of goods and the weight loaded.
- Potentially additional commercial information.
- If required, other labelling regulatory information.

The notes are kept as evidence of receipt or dispatch, for as long as is requested in commercial contracts if applicable, or as per local, national or EU legislation or standards applicable to such documentation or for a period appropriate for the use to which the products are placed on the market.. If necessary, the dispatch documents will refer to the relevant commercial contracts. They are added to by other transport documents relating to the same movements: waybills, applications, bills of lading etc. and any documents relating to the batches concerned stipulated in the contract such as quality, origin or acceptance certificates.

6. Quality monitoring

Prevention is mainly carried out by means of actions, information, instructions and specifications supplied to the delivery people and delivery intermediaries.

Food and feed safety quality monitoring throughout the process, from receipt through to dispatch, is mainly carried out via a control plan and warning systems which should help choose the appropriate corrective measures to be applied.

Product specifications must be determined between the operators and confirmed in a contract and/or agreement. These specifications must be clear and unambiguous.

The operator must ensure that all delivered products meet the specifications laid down in the contract and/or agreement.

A plan of the facilities referencing each storage bin is available at each site.

Labelled and referenced samples, for commercial use and traceability are taken according to the usual standards and wherever possible in the presence of both parties, during commercial receipts and dispatches. If an appointed approver is present, then this person will be responsible for these operations.

The samples are stored by the manufacturer or food/feed processors, if applicable, for a period appropriate for the use to which the products are placed on the market or as per existing local, national or EU rules and/or per contractual requirements. These samples allow for quality controls to be carried out with regard to the conditions of receipt, contractual criteria or regulatory standards.

7. Goods with specific regulations

During the entire process from receipt of the crop to its commercial delivery, appropriate measures are implemented to guarantee the strict physical separation between ordinary goods and those with specific trading regulations: such as products originating from organic agriculture, GMO products, goods intended for certified seed production or other specificities.

To limit the risks of these products being accidentally mixed together, specific measures must be put in place. If the circuits are not dedicated to specific goods, then all mixed use circuits (pits, lifts, conveyors, equipment or bins) must be cleaned appropriately and the cleaning effectiveness verified before goods with different regulations are allowed to pass through. It is important to remember that dedicated circuits are a regulatory requirement for the production of certified seeds.

The administrative management must be adapted to the various goods regulations that coexist within the same operator or site:

- Stock records keeping specific to goods with particular regulations.
- Organization of any certification needed and recording of certificates.
- Specific communication to upstream operations (instructions, specifications, contracts).
- Specific rules are provided for labelling and transport supporting documents.

Chapter III

Good hygiene practice recommendations for collection / receipt operations

1. The external environment

Pests living in unmaintained pits or unused equipment or attracted by waste or stagnant water are known sources of contamination.

It is therefore important to ensure that:

- The buildings' immediate surroundings are maintained. In particular, lawns, areas not covered with concrete and pits will be maintained.
- The rain and run-off water drains well.
- Rodent traps are positioned in the areas surrounding the grain and waste storage locations.

2. Receipt of goods

The presence of foreign bodies or impurities in the vehicle due to insufficient cleaning is a source of contamination.

a. Crop deliveries by farmers

Crops are transported by agricultural trailer or by truck.

- Remind contractors and farmers of their obligations (by post, training material, signs etc.) in terms of the internal and external cleanliness of the means of transport.
- Ask for the truck to be cleaned if a product other than cereals or oilseeds has been transported.
- Farmers and contractors should adhere to the recommendations contained in the good hygiene practices guide for field crops, particularly regarding rules on cleaning and succession of transport.

b. Other transports (internal transfers, crop collection)

For this kind of transport, the rules described in chapter V "Dispatch / delivery" apply.

c. Control at receipt

When products are received, for each unit delivery ensure to:

- Identify and register the delivery (contributor, name of the product, quantity, etc.).
- Ask whether storage pesticide treatments have been applied to the grains prior to delivery to the operator's premises and if available, details on the active substance used, doses applied and date of application.
- Sample.
- Carry out an olfactory and visual inspection of the delivered batch to detect the potential presence of a bad smell, insects, foreign bodies or treated seeds.
- Analyse the moisture and impurity contents of the delivered batch.
- Any control applied must be validated to ensure they are effective. For example, this means demonstrating by analytical or other means that a statement made about a control is true and the control works as intended. Records of this must be kept for future reference.

The operator must also set criteria for classifying and allocating the products received. They will in particular determine the type of technological analyses to be performed on receipt to characterise the product.

Chapter IV

Good hygiene practice recommendations for storage operations

This unit applies to the storage facilities which belong to the operator.

If the operator uses a storage service provider, a written agreement should be concluded about what it has been defined in this chapter IV. The operator is the guarantor for the hygiene quality of the goods they market. These goods may be contaminated during storage by the premises, equipment, staff, transport and waste.

1. The premises

a. The construction or modification of storage and handling premises and galleries

Foreign bodies such as pieces of metal from ceilings, storage bins or equipment above the grains are sources of contamination.

The design of the premises must allow for the implementation of good hygiene practices, particularly regarding risks of contamination from insects and animals and to prevent any contact with toxic and non-food substances. The recommendations contained in this guide must be integrated during the construction or modification of the buildings.

It is important to ensure that:

- The premises are out of bounds and tiles are repaired, windows are kept closed or fitted with nets or grids or any other appropriate means to reduce the likelihood of pests and birds entering.
- The premises are kept in good repair. The roofing in particular should be kept watertight to prevent the stored products from being altered by water, which can cause mould and attract insects.
- Foreign bodies are prevented from dropping down, thus contaminating the grains; it is especially important to take this into consideration when designing new equipment.

Construction materials and more specifically joints and coatings must be carefully selected in order to prevent contamination of the stored products. In particular, it is recommended not to use bitumen or equivalent substances in warehouses for the storage of cereals, oilseeds, protein crops and their derived products.

b. The layout of the storage and handling premises and galleries

i. Prevention of cross contamination

- Store the pesticide treatment products in retention tanks to prevent any cross contamination with the grains.
- Store pesticides, fertilizers, seeds or substances considered dangerous or inedible and waste in premises that are clearly separate from those used for storing grains to prevent any accidental mixing.
- Label the substances considered dangerous or inedible in order to prevent any confusion.
- Take measures to prevent grains from being contaminated by rodent poison, for example by using bait in boxes.
- Prevent vehicles from parking (fork lift trucks, Lorries) in storage areas.
- Animal protein meal and fish meal must be, based on risk assessment, stored separately in specific sheds separated from each other as laid down by Regulation No.999/2001. Upon specific conditions, this requirement can be derogated according to Annex IV of Regulation No.999/2001.
- Other feeding stuffs including minerals may be stored in the same shed but they must be kept physically separated.

ii. Maintenance and cleaning

Grains infested or attacked by mould, residues from the bottom of bins that have not been cleaned, insects or mould proliferating in premises where dust has accumulated due to poor cleaning or the inability to clean due to the design of the premises, are all sources of contamination. This is also the case with foreign bodies such as pieces of metal from ceilings, storage bins or equipment above the grains.

It is important to ensure that:

- Preventive maintenance is applied in the premises (roofing, storage bins) to prevent the presence of foreign bodies (pieces of metal, glass, concrete).
- At least once a year or after collection, the handling premises and galleries are cleaned to limit the accumulation of dust which favours the development of mould and attracts insects. Particularly in areas where dust hides marks present on the floor, clean the premises so that the marks always remain visible.
- The grain storage facilities (bins, compartments) are cleaned, particularly if the previous goods stored were contaminated (insects, mould).
- A cleaning plan is defined (who, what, when, how, recording) and the cleaning effectiveness verified.

iii. Ventilation and inter-bin transfer

The absence of or poor inter-bin transfer or ventilation conditions can lead to the proliferation of insects or development of mould, which are sources of contamination.

✓ Ventilation

Ventilation consists of sending a mass of air at least equivalent to the mass of grain in a volume. This operation removes heat and helps obtain a mass of grain that is in balance with the air temperature. Ventilation optimization largely depends on the operator's know-how.

It is important to ensure that:

- The grain is quickly cooled to avoid attracting insects.
- The grain is ventilated with air that is cooler than the grain. A minimum temperature difference of 5°C (to be adjusted according to the external temperature and the ventilation equipment) is recommended. These conditions can be ensured by using a thermostat.
- The evacuation of hot air is facilitated to prevent dew points from forming. This could be achieved by means of ventilation shafts, skylights or extractors for example.

✓ Inter-bin transfer (grain aeration)

Inter-bin transfer aerates the grain by allowing the pile of grain to come into contact with the air (thermal evacuation is therefore very local and limited). It also decompacts a pile of grain in which air can no longer flow and favours the dissipation of heat.

If there is no means of ventilation, it is important to ensure that:

- The grains are transferred between bins to ensure the products' preservation, until their temperature has achieved the appropriate level.

iv. Pest control

The accumulation of dust or infested grains favours the proliferation of insects and attracts rodents in the galleries, contaminating the grains stored in the bins nearby.

It is important to ensure that:

- Domestic animals as well as birds are not allowed in the premises.
- A rodent extermination plan is implemented. The bait must be checked and replaced regularly. The operator may use the services of an external company for pest control.
- The storage and handling premises and galleries are cleaned and treated with pesticide, especially controlling all points where dust and grains can stagnate.
- Residue levels and compliance with legislation are primarily demonstrated by records of correct usage of pesticides. This should be verified by random sampling according to a schedule. Records of this must be kept for future reference.

- The grain is protected against insects by using all measures available at the site (cleaning, storage control, ventilation, fumigation, rational use of storage pesticides etc.).

c. Storing samples

Pierced sample bags attract and can lead to the proliferation of pests, which are a source of contamination.

It is important to ensure that:

- The grain samples are stored in places appropriate to the storage duration.
- These places are kept clean and protected from pests by cleaning them, treating them with pesticide and organizing a pest control plan.

Premises: examples of controls and records

- Control the cleanliness (visibility of dust crosses) and tidiness of the premises.
- Control the absence of insects and pests (visual controls during transfers, odour, control of birdlime boards or dead animal count etc.).
- Monitor the consumption of pesticide products, rat poison etc.
- Keep a record of the maintenance, cleaning, pesticide treatment and rat extermination operations carried out in the premises.
- Keep a record of any noted anomalies (leaks etc.).

2. The pits, handling and sorting equipment

The foreign bodies generated by a lack of maintenance and the presence of pests due to a lack of cleaning and/or pesticide treatment are sources of contamination.

It is important to ensure that:

- When new equipment is being purchased or designed, it should be made accessible to make cleaning and maintenance easier and prevent the creation of conditions favourable to the appearance or development of hazards (insects, mould).
- The equipment is periodically cleaned, particularly before the storage of cereals and other grains (pits, dryers). Treatments are made according to Plant Protection Products manufacturers' instructions so that residues do not exceed authorised levels. Where applicable and based on Risk analysis and/or monitoring plans, the residue level may be validated after the cleaning.
- Preventive maintenance is carried out on the equipment by lubrication to prevent breakages which could cause foreign bodies.
- The pits are protected against bad weather and run-off, rodents and birds, for example by covering the pits situated outside the buildings after use or closing the pits' shutters.
- In the case of an initially contaminated circuit, it is treated and/or cleaned if necessary before sound grain is transited to prevent it from becoming contaminated.
- The sensitive points (pits, elevator bases) are treated with pesticide if necessary. The pesticide treatment appliances are regularly monitored and preventive maintenance is carried out. An appropriate pesticide treatment appliance is used to prevent siphoning (unintentional product drainage).
- The presence of foreign bodies from equipment is combated by fixing grids onto the receipt pits, tidying away the equipment after it has been used and cleaning the grains if there is any doubt as to the presence of foreign bodies.

Examples of equipment which aims to improve food and feed safety

<i>Equipment</i>	<i>Hazards controlled</i>
<i>Grids on pits</i>	<i>Foreign bodies and pests of a size larger than the grid holes</i>
<i>Cleaner</i>	<i>Foreign bodies, microbial load, mycotoxins</i>
<i>Pesticide treatment appliance</i>	<i>Insects</i>

Equipment: examples of controls and records

- Preventive – curative maintenance book.
- Preventive maintenance plan for sensitive equipment.
- Record of equipment maintenance and cleaning.
- Record of the product used for the pesticide treatment.

3. Waste

Waste can be a source of contamination or attraction and proliferation of insects and rodents, which carry diseases.

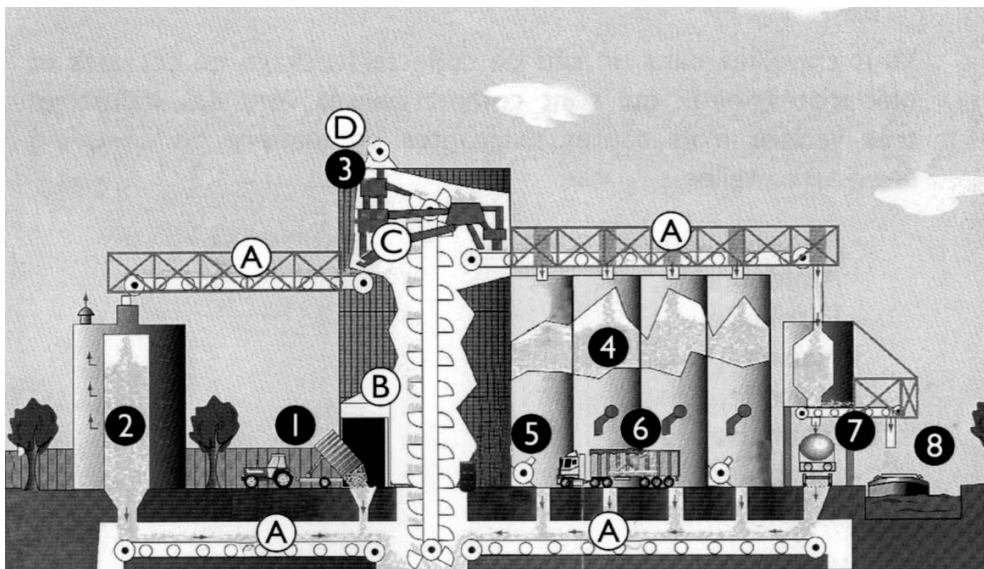
It is also important to ensure that:

- The waste (boxes, packaging, scrap iron) storage area is located in a place that is separate from the grain storage facilities.
- Waste containers are provided.
- Waste collection is scheduled with appropriate frequency.

Residues from maintenance work, such as pieces of metal, due to the bin being insufficiently protected during the maintenance team's intervention are contaminants. These should be regularly cleared and the site should be cleaned once the maintenance operation is complete.

Example plan of a silo

"West Indies Illustration"



Stages of the grain's progress:

1. Receipt
2. Drying
3. Cleaning and separation
4. Storage bin before dispatch
5. Ventilation of the grain
6. Dispatch by lorry
7. Dispatch by train
8. Dispatch by barge

Mechanics of the silo:

- A. Belt or chain conveyors
- B. Bucket elevators
- C. Dust suction system
- D. Vacuum equipment with air outlet

Chapter V

Good hygiene practice recommendations for dispatch / delivery and transport operations

Raw materials intended for human food or animal feed are transported by road, river, rail or sea. Goods must be transported in compliance with the regulations specific to transport, particularly the provisions relating to food and feed safety. Whatever means of transport is used; the transport contractor and the transporter are responsible for ensuring the equipment conforms to food and feed safety requirements.

The presence of foreign bodies, impurities or residues in the containers (due to insufficient cleaning or other bad practices) is a source of contamination.

1. General rules (applying to all kinds of transport)

- Food and Feed business operators shall notify the appropriate competent authority of any establishments under their control, active in transport as laid down by Regulation No.183/2005 and Regulation No.852/2004
- Food and feed safety must be maintained at all times during transport. It is necessary to prevent any contamination caused by undesirable substances and products. Mixing with other products must also be avoided.
- It must be ensured that rain and spray cannot enter the container during transport.
- The sender of the goods keeps the references of the means of transport used for each batch that is dispatched (e.g. registration numbers of the trailers, wagon numbers, names of the canal boats, barges, ships etc.).
- Before the loading compartments are loaded they must be inspected by staff authorised by the operator and/or the appointed approver to check, preferably visually, that the containers:
 - Are clean, dry, odourless and correctly maintained.
 - Do not contain pests and rodents in the widest sense of the term.
 - Do not contain residues from previous loads and/or cleaning products.
 - Are compatible with the loading and transport of the specific products.
 - Are suited to the transport required and form a closed whole.
- The transport compartment must sufficiently protect the products being transported from the influence of other products transported at the same time. Appropriate means must also be available to remedy any harmful influence from other products that could arise during loading and transport.
- Compartments that have been used to transport products regarded as “high-risk” during the previous load must undergo a risk analysis and may be refused. Depending on the previous load, cleaning / disinfection / requalification rules for the containers are defined in Appendix 8.
- Bulk products must be transported in accordance with the requirements detailed in Appendix 8 “Transport” of this Guide or equivalent guidelines (e.g. QUALIMAT Transport®, GMP Transport, QUALIWAG etc.).
- For transports chartered by the operator from external transporters, the transport contracts will refer to the specifications the operator must enforce with its transport service providers. These specifications set out the obligations of the external transporter, particularly with regard to:
 - The rules for successions of loads (see Appendix 8).
 - The availability, for each piece of equipment, of chronological records or documents allowing the previous transport type to be traced.
 - Compliance with hygiene rules and the use of appropriate means to keep the equipment thoroughly clean and free from any risk of contamination.
 - The need to inform and train the drivers and maintenance staff of the transport equipment on how to comply with these rules.
 - The need to include compliance with these obligations in the service provider’s own contracts if any work is sub-contracted.

- The operator informs his silo staff of the food and feed safety risks linked to the transport operations.
- Any control applied must be validated to ensure they are effective. For example, this means demonstrating, randomly, by analytical or other means that a statement made about a control is true and the control works as intended. Records of this must be kept for future reference.

2. Road transport

Road transport can be done by the operator on its own behalf or by external transport companies which have a food and feed safety system in force.

For all road transport, the driver must be able to present the logbook stating the previous load and, if relevant, any cleaning operations that have been carried out.

Road transport must be done in accordance with the following requirements:

- Before loading the products, all visible residues from the previous load must be cleared from the outside of the vehicle, including the chassis.
- In order to facilitate traceability, it is important to correctly label the containers.
- The documents used to check the transport's compliance with the specified requirements (previous loads, cleaning etc.) are recorded and stored by the operator. The operator defines the storage duration for these documents in line with its outlets.
- The tarpaulin covers used must be clean and watertight.

a) *Transport carried out by the operator*

- Before use, check the trucks and clean them if necessary.
- Visually check that there are no hydraulic fluid or fuel leaks.
- Check the nature of the last load and clean the truck if necessary, in accordance with Appendix 8 of this guide.
- For each container, record and store the history of the loads and cleaning operations.
- Inform the drivers of the food and feed safety risks and the necessary cleaning operations for their vehicle according to the products transported.

b) *Transport carried out by external companies*

- If the operator charters the transport, draw up specifications with the transport service providers. These specifications include requirements relating to the cleanliness of the receptacle, recording of the previous transport and management of transport incompatibilities, in accordance with Appendix 8 of this guide or equivalent guidelines.
- In all cases, before any loading takes place, check the condition of the truck in accordance with paragraph 1 of this section. Visually check that there are no hydraulic fluid or fuel leaks. Ask the transporter to clean the vehicle if necessary. Record any requests for corrective actions.
- The history of the loads and cleaning operations must, for each container, be recorded and stored by the transporter who must keep them available to the contractor.

3. Transport by sea, waterways and rail

Boat men and wagon drivers must be able to present a logbook listing their successive journeys (type of goods, type of cleaning carried out and on what date).

The cargo hold, hatch covers and loading hatches of the boats used to transport grains must be clean, watertight, dry, odourless, and in perfect maintenance condition. They are suited to the required transport and able to protect the goods effectively.

For trains, the equipment provided is specialised, that is, exclusively intended for transporting raw agricultural products (cereals, oilseeds and their by-products, malt etc.). The hoppers inside the wagons used to transport grains must be clean, watertight, dry, odourless, and in perfect maintenance condition. This equipment is suited to the required transport and able to protect the goods effectively.

Before loading the products, operators using a ship or wagon approved for transporting their products must be told what the previous load was by the transporter.

When products are transported by sea, waterway or rail under the operator's responsibility, the loading compartment must be inspected or a certificate of cleanliness must be issued for the compartment, along with a description of the previous load, before loading can begin. Food and feed safety must be preserved at all times during the loading operation.

The compartment is inspected or the cleanliness certificate is issued by:

- A recognised inspection company operating in accordance with recognised international standards.
- Or a qualified person (freight forwarder) who is recognised as a qualified loading inspector.
- Or by the operator's qualified staff in the event of loading entrusted directly to the operator alone or in the absence of an appointed inspector during loading.

This conformity inspection operation is recorded. If the inspection is carried out by an inspection company or a qualified inspector, the results of the Loading Compartment Inspection and the previous load must be recorded in writing in the inspection report (LCI).

The ship chartering operators must ensure that details of the last load and any cleaning / washing / disinfection operations carried out are provided in the chartering contract or any other contractual document approved by the parties.

Any anomalies noted must be recorded. Appropriate corrective actions must be requested (disinfection, pesticide treatment, replacement etc.) and recorded.

SECTION II

APPLICATION OF THE H.A.C.C.P. SYSTEM (HAZARD ANALYSIS, CRITICAL CONTROL POINTS)

Chapter I *Presentation of the study*

The second section of this guide deals with establishing a control and monitoring system for the food and feed risks specific to the collection, storage, trade and transport of cereals, oilseeds and protein crops by applying the principles of the H.A.C.C.P. method. (Refer to Appendix 1 on the H.A.C.C.P. method).

The study presented in the remainder of the guide constitutes an adaptable basis for implementing the H.A.C.C.P. method as a given operator. It constitutes reflection material, a reference for collection/storage organizations. Each operator must adapt it to its own organization and markets. For optimum effectiveness, a working group should be created and a hazard analysis carried out by the operators.

The scope of the study concerns the collection, storage, trading and transport of cereals, oilseeds and protein crops, from receipt through to dispatch. The chemical, biological and physical hazards dealt with are specific to the collection/storage task. Only hazards that could affect the consumer's safety are addressed in this study.

In relation to each of the stages as described in Appendix 3 (receipt, pre-storage, storage, pesticide treatment, preparation relevant to the contractual requirements, dispatch delivery) specific types of control are foreseen based on adequate risk analysis and sampling/monitoring plans..

Chapter II *Content of the study*

1. Creating the H.A.C.C.P. team

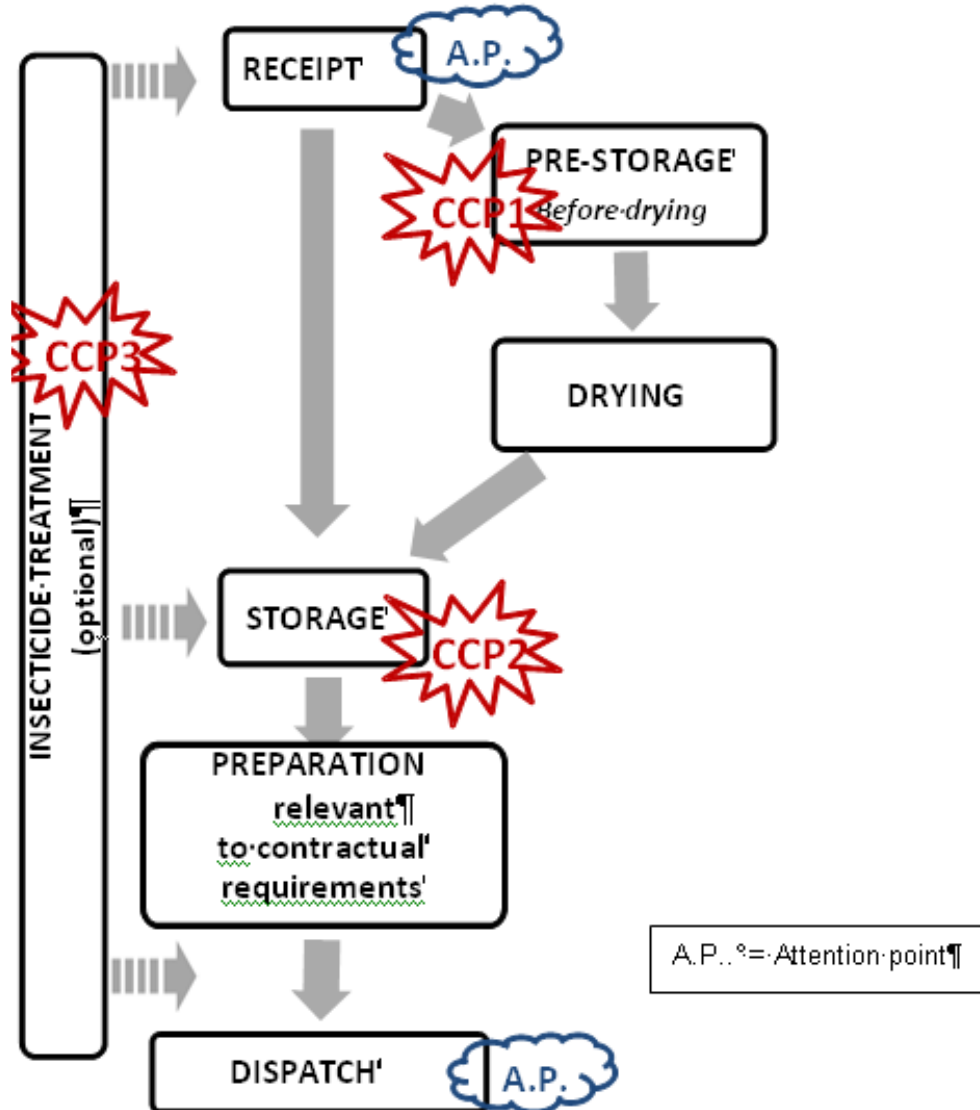
The H.A.C.C.P. analysis is the result of work carried out by a team with multi-disciplinary skills with the support of experts in the scientific, technical and regulatory domains. Refer to the Acknowledgements page in the introduction to this guide.

2. and 3. Describing the product and identifying the intended use of the product

The working group has described different product categories. Refer to the product fact sheets in Appendix 2.

4. Drawing up a diagram of the stages

There are seven stages in the collection/storage of cereals, oilseeds and protein crops, which follow on from one another as shown below:



- Cleaning is carried out, where necessary, during the drying, storage and preparation stages according to contractual requirements.
- Between each stage, handling operations are carried out. These handling operations can also take place during an inter-bin transfer.
- Inter-bin transfers are carried out if necessary to optimize the storage plan or facilitate an intervention on the stored grain (aeration).

Refer to the description of the stages in **Appendix 3**.

5. Checking the operations diagram on site

The diagram above is a "standard diagram" created for conducting the hazard analysis and determining the ensuing critical points. The order and number of stages may vary from one site to the next.

6. Carrying out the hazard analysis

6.1 List of the hazards

The potential hazards which could arise during the collection and storage of cereals, protein crops and oilseeds are the following:

Nature of the hazard	Example of hazard
BIOLOGICAL OR MICRO-BIOLOGICAL	Flora: - Mould, bunt, <i>Bacillus cereus</i> , salmonella Mycotoxins: - Ochratoxin A, trichotecenes (including DON and T ₂ / HT ₂), zearalenone, fumonisin, aflatoxins. Pests: - Insects from cereals and oilseeds, fowl, rodents Ergot
CHEMICAL	Pesticide residues: - Storage pesticides Heavy metals: - Cadmium, lead Treated seeds Dioxin
PHYSICAL	Foreign bodies: - Broken bulbs, bits of gravel, pieces of metal, transport residues etc.
ALLERGENS	Allergenic products: - Cereals containing gluten (wheat, rye, barley, oats, spelt, kamut or their hybrid strains)

6.2. Hazard analysis

- *Description of the hazards*

To assess the hazards in cereals, protein crops and oilseeds during the different stages of the silo diagram, we have created hazard fact sheets which can be found in Appendix 4. These sheets give a general description of the hazard, specify the origin, the conditions favourable to its persistence, proliferation or elimination and provide a reminder of the current regulations and recommendations.

- *List of the causes of the hazards*

At each stage in the operations diagram, the causes of the potential hazards are identified using the "5 Ms method". This method is extremely thorough and therefore means that no potential cause of a hazard is omitted. See below the example applied to the storage of cereals, oilseeds and protein crops:

The 5 Ms method:

Material	Cereals, oilseeds or protein crops
Environment	Atmosphere, surrounding areas
Labour	Hygiene
Method	Operating method

Equipment

Installations, transport equipment

- *Evaluating the risk relating to each hazard*

The **hazards are then prioritized** for each cause, based on:

- Severity (G) which corresponds to the consequences of the hazard on the consumer's food and feed safety,
- Frequency (F) of the hazard's appearance,
- And the likelihood of the hazard not being detected (D).

These indices are quantified using a scale of 1 to 4, based on current technical and scientific experiments. The H.A.C.C.P. study also takes into consideration the impact of the agricultural raw materials and the role played by the storage processes. The product's final destination and the data from monitoring plans are also considered.

	Severity (G)	Frequency (F)	Detection (D)
1	minor severity	practically non-existent	hazard that can always be detected
2	medium severity	possible	hazard that is detected most of the time
3	critical severity	current	hazard that is difficult to detect
4	catastrophic severity	certain	non-obvious hazard

Refer to the assessment scales used for the study of this guide in Appendix 5.

As part of the hazard analysis, to quantify the severity index, contamination, survival and multiplication factors are also taken into account if necessary.

By multiplying the marks allocated for severity, frequency and the likelihood of not being detected, a risk index $R = G * F * D$ is obtained.

R gives an indication of the significance of the risk: **the hazards for which R is high (greater than or equal to 24) and/or the severity G is equal to or greater than 3** are dealt with as a priority.

Refer to the H.A.C.C.P. plan in the following pages and the hazard analysis tables in Appendix 6.

- *Determining the preventive control measures*

Preventive control measures were defined for each cause of an identified hazard: refer to the H.A.C.C.P. plans on the following pages and the hazard analysis tables in Appendix 5.

7. Determining the critical points for controlling the hazards: the C.C.P.s

The stages constituting potential CCPs were identified using the Codex decision tree (below) when its application was relevant and the risk index was significantly high ($R \geq 24$ and/or $G \geq 3$).

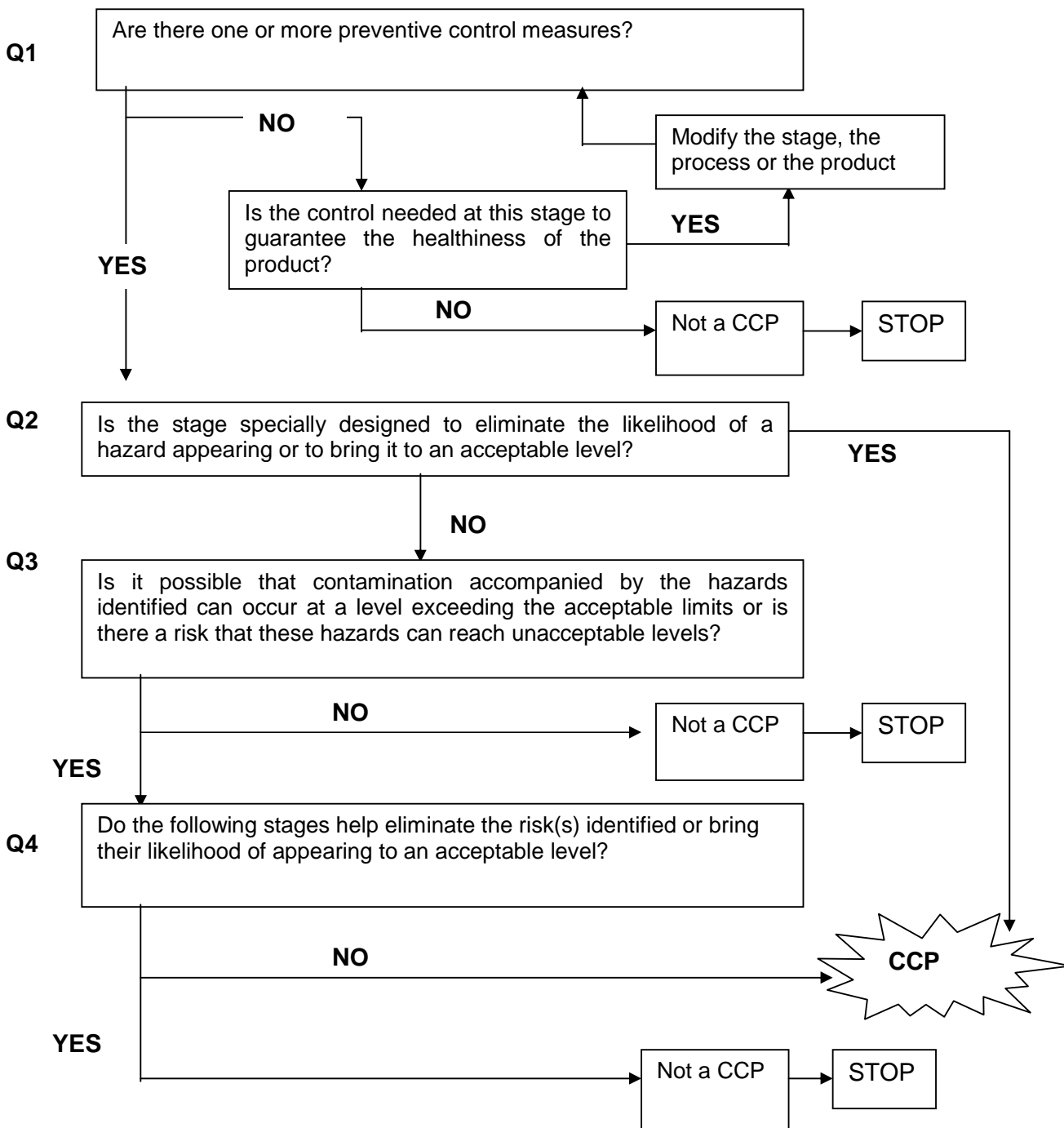
3 C.C.P.s were identified:

	BIOLOGICAL OR MICRO-BIOLOGICAL			CHEMICAL
	Insects	Mycotoxins		Storage pesticides residues
		Field	Storage	
Receipt		(Attention point ¹)	(Attention point ¹)	
Pre-storage		CCP1		
Drying			CCP1	
Storage			CCP2	
Pesticide treatment				CCP 3
Preparation relevant to the contractual requirements				
Dispatch - delivery		(Attention point ¹)	(Attention point ¹)	

¹ The absence of a continuous (or quick result) method for monitoring the batches at receipt and dispatch does not allow these stages to be classified as CCP for field and storage mycotoxins.

Figure 1: Determining the critical control points (CCP)

Example of a decision tree for determining the CCPs (answer the questions in order)



Example of answers according to the decision tree: CCP 3

Q1: At the pesticide treatment stage, are there one or more preventive measures?

YES



Q2: Is the pesticide treatment stage specially designed to eliminate the likelihood of pesticide residues appearing or to bring it to an acceptable level?

NO



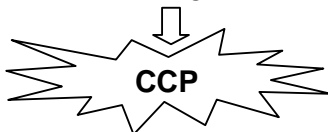
Q3: Is it possible that contamination accompanied by pesticide residues can occur at a level exceeding the acceptable limits or is there a risk that the quantity of residues can reach unacceptable levels?

YES



Q4: Do the following stages help eliminate the risk(s) identified or bring their likelihood of appearing to an acceptable level?

NO



Example of answers according to the decision tree: case of drying

Q1: At the drying stage, are there one or more preventive measures?

YES



Q2: Is the drying stage specially designed to eliminate the likelihood of storage mycotoxins appearing or to bring it to an acceptable level?

NO



Q3: Is it possible that production of storage mycotoxins can occur at a level exceeding the acceptable limits or is there a risk that the quantity of storage mycotoxins can reach unacceptable levels?

YES



Q4: Do the following stages help eliminate the risk(s) identified or bring their likelihood of appearing to an acceptable level?

NO

(the storage/preservation by ventilation stage)



Drying aims to reduce the grains' water content and prepare them for subsequent good storage. The drying activity is therefore an important stage in maintaining the grains' hygiene quality at the storers. However, during the storage stage, storage mould and mycotoxins can develop from sound grains due to a practice fault, poor insulation or a condensation phenomenon. According to the decision diagram, the drying stage is therefore the last stage at which the risk of mould and storage mycotoxin development can be controlled.

8. 9. and 10. Establishing the critical limits, a monitoring system and corrective actions for each CCP

For each C.C.P. determined, the working group defined criteria to be measured, critical thresholds, monitoring procedures and corrective measures. To define them, they called upon the experience of each member of the H.A.C.C.P. team in the domain of the hazards concerned and the scientific and technical information already published. Refer to the H.A.C.C.P. plans on the following pages.

11. and 12. Defining the verification methods and establishing a documentation system

Verification of the H.A.C.C.P. system corresponds to measures for monitoring all elements of the system. It may include a review of the HACCP system (notably on the basis of non-conformities, complaints etc.), the monitoring plan results, and internal audits of the HACCP system, which may be documented as part of the quality system. This verification mainly relies on consulting registers and files provided for this purpose.

Records must be kept of monitoring actions and preventive and corrective measures. By way of illustration, examples of documentation are proposed. Refer to the H.A.C.C.P. plans on the following pages.

HACCP PLAN

Product Oilseeds

Stage PRE- STORAGE

CCP	Hazard / Causes of the hazard	Risk	Recommended preventive measures	Criteria	Critical thresholds	Monitoring procedures	Corrective measures	Example of HACCP documentation
CCP No.1	<p><u>Field and storage mycotoxins</u> /</p> <p>Too long storage duration of a contaminated good with a high humidity level and/or high % of broken grains or level of impurities</p>	G=3 / R=24	<p>Organization of the harvests. Management of the time periods between collection and drying. Rotation of hoppers or pre-storage areas (FIFO – First In First Out principle). Management of the dryers. Raise contractors', farmers' and employees' awareness on the harvest time.</p>	Time	Variable depending on the goods and level of humidity	Monitoring of pre-storage time	Identification of the batch	Dryer internal management procedure

HACCP PLAN								
Product Oilseeds								Stage STORAGE
CCP	Hazard / Causes of the hazard	Risk	Recommended preventive measures	Criteria	Critical thresholds	Monitoring procedures	Corrective measures	Example of HACCP documentation
CCP No.2	<u>Storage mycotoxins</u>	G=3 / R=24	Maintenance / Cleaning of the bins - Cleaning of the silo / Pesticide treatment Good storage design	Temperature	<ul style="list-style-type: none"> • A rise in temperature (e.g. of 5°C) between two readings 	Temperature monitoring	Ventilation Inter-bin transfer Maintenance Staff awareness raising Identification of the batch	Control records
	Method Poor bin rotation / Ineffective cleaning of the grains / Lack of or unsuitable ventilation / Mixing of goods Damp raw material Equipment Unloading points too high (broken grains) / Poor bin sealing (infiltration of water) / Ineffective ventilation (performance of the ventilator, height of the bins, extraction) / Insufficiently clean bins / Dryeration bins not isolated / Lack of thermometry			G=3 / R=24				
				Appearance of the rick	<ul style="list-style-type: none"> • Presence of sprouting, crusting, colour 			

HACCP PLAN								
Product Oilseeds			Stage PESTICIDE TREATMENT					
CCP	Hazard / Causes of the hazard	Risk	Recommended preventive measures	Criteria	Critical thresholds	Monitoring procedures	Corrective measures	Example of HACCP documentation
CCP No.3	<p><u>Residues from storage pesticides</u></p> <p>Equipment Contamination of the material by a leak in the pesticide treatment equipment.</p> <p>Method (poor regulation of the equipment, grain flow variation, multiple treatments leading to an overdose, waiting time necessary after treatment and before use of the goods is insufficient). Pesticide not approved for oilseeds</p>	G = 3	<ul style="list-style-type: none"> Maintenance of the pesticide treatment equipment. Operating method / train staff in pesticide treatment methods and the pesticide choices, servo-control of the elevator's functioning, periodic control of the flow meter. Increase staff awareness (silo, production, drivers, boat men etc.) on complying with waiting times after treatment of the goods and before their use. 	<p>Quality of the pesticide</p> <p>Quantity of pesticide consumed</p>	<ul style="list-style-type: none"> Unsuitable product Approved dose exceeded 	<ul style="list-style-type: none"> Purchase of authorized pesticide, verification of the pesticide's adequacy before use Control of the flow meter's functioning and regulation Monitoring of the pesticide's consumption Control of the last treatment date 	<ul style="list-style-type: none"> Curative maintenance Isolation of the batch Increase the storage duration before use Information to the customer on the necessary waiting time before use 	<ul style="list-style-type: none"> Maintenance report Verification report Treatment records <p style="text-align: center;">Treatment records</p>

Field mycotoxins attention point

Place of appearance	Field	
Key control stage	Receipt = attention point	
Stage in the process that could affect the level	Cleaning ↓	Pre-storage ↗
Control measures	<p><u>During cultivation</u> Advice/Recommendations during cultivation</p> <ul style="list-style-type: none"> ➤ Varieties ➤ Technical itineraries <p>Field survey</p> <ul style="list-style-type: none"> ➤ Anticipation of the risks <p>Allocation on receipt</p>	<p><u>During pre-storage</u> Control of the pre-storage duration (CCP1)</p>
Internal checks on receipt	Take a sample from each trailer received (or when taken out of the dryer in the case of drying) Obtain a representative sample from each bin Check these samples using the risk analysis for the collection area	
Internal checks on dispatch	Take a sample from each dispatch Check these samples using the risk analysis specific to the operator	

APPENDIX 1

H.A.C.C.P.

(HAZARD ANALYSIS, CRITICAL CONTROL POINTS):

THE METHOD

H.A.C.C.P.

(Hazard Analysis, Critical Control Points):

THE METHOD

1. General information and prerequisites

The H.A.C.C.P. is a method used to effectively identify the critical points for which control measures are essential to preventing or limiting identified hazards. It is implemented for a given product and process, step by step and hazard by hazard.

The success of its application relies on the shared will of the management and all of the staff. Another essential prerequisite consists of adhering to the general hygiene rules established for the profession; these good hygiene practices determine the effectiveness of the control measures (refer to the good hygiene practice recommendations section contained in this guide).

The measures that have been included in the guide can be integrated into one of the company's management systems (ISO 9000, ISO 14000, ISO 22000 etc.), when it exists, and notably complete the documentation system. It should also be pointed out that the HACCP system, like the management system undergoes amendments aimed at improving the method, in the light of regulatory, standards, technical and scientific developments.

2. The application in 12 stages

2.1. Creating and running the H.A.C.C.P. team

- *Defining the scope of the study:*
Based on the current regulations and potentially a summary of the customers' requirements, the management must:
 - Identify the hazards to be considered (biological, chemical and physical),
 - Determine the places and productions concerned (number of sites, types of production).
- *Creating the H.A.C.C.P. team:*
Create a group of 2 to 8 people who possess the necessary skills and know about the hazards from which the operator wants to protect itself. This team must contain at least one representative of the decision-making power, a coordinator who will guarantee the method and a storage representative, in order to group together all of the necessary skills in the different domains (storage, maintenance, regulations, food and feed safety, hygiene etc.).
- *Planning the initiative:*
Specify the different stages, the managers, the time scales and the dates on which checks will be carried out on the study's progress.
- *Training:*
The operator must train:
 - All staff on food and feed safety hazards and good hygiene practices based on this guide.
 - The team responsible for the study of the HACCP method in order to successfully complete the project.
 - The field staff (silo, maintenance, drivers) on applying the HACCP system.

2.2. Describing the product

Describe the raw materials received and the products marketed (preparation and processing carried out, physicochemical characteristics, food and feed safety characteristics, packaging – packing, storage length, storage conditions).

2.3. Identifying the intended use of the product

Determine the normal methods of use by the end user or the consumer (animal feed, flour trade, starch industry, semolina production, oilseeds-crushing industry etc.), and any particular methods. Identify the high-risk populations (children etc.).

Take into consideration any potential subsequent processing (grinding at the flour mill or semolina factory removes the bran and reduces the microbial or mycotoxin load).

2.4. Drawing up an operations diagram

Accurately describe all of the elementary stages of the diagram. The food and feed safety management parameters of the stage must be stated (temperature, humidity, duration etc.). Traditionally each stage is represented by a rectangle and the stages are linked together by arrows.

2.5. Checking the operations diagram on site

Check that the operations diagram is accurate and complete in practice. The *Codex Alimentarius* stipulates that “the HACCP team must permanently compare the development of the activities with the operations diagram and, where appropriate, modify it”. In practical terms, the HACCP team is present on site and assists in the development of the operations from receipt of the goods from crops or transfers to dispatch or even delivery to the customer. The technique consists of questioning the silo staff with open questions on their daily work: “What are you doing?” “And then?”.

Stages 6 to 12 that follow form the 7 principles of the H.A.C.C.P. method.

2.6. Conducting an analysis of the hazards (Principle 1)

Make a list of all the possible hazards (known or conceivable) by brainstorming and by using the 5 Ms method referring to this guide, scientific articles or works, customer requests etc.

Only retain real hazards, that is, those likely to significantly affect the consumer's food and feed safety. For example, a dead insect in a batch of corn is not a significant hazard for the consumer.

List all of the causes of the hazards identified at each stage in the operations diagram.

At each stage, assess the relative risk of each hazard (evaluation of the severity, the frequency of its appearance and the likelihood of it not being detected).

Determine the control measures for the hazards identified.

2.7. Determining the critical points for controlling the hazards: the C.C.P.s (Principle 2)

For each hazard, apply the decision-making tree or logic diagram (refer to page 34, Figure 1 – Determining the critical points) where appropriate.

This is only a tool and is not intended to replace the team's own expertise or thinking. There are several models. A C.C.P. should control a hazard, prevent it, or bring it to an acceptable level; if this is not the case, it is not a C.C.P. Monitoring actions carried out on the C.C.P.s ensure the control measures are implemented effectively.

For practical reasons, the C.C.P.s should be noted on the operations diagram (refer to the diagram on page 30) and a HACCP plan should be established based on the C.C.P.s identified (refer to section II in chapter 2 of this guide).

2.8. Establishing the critical limits for each C.C.P. (Principle 3)

This involves defining the measures on which the C.C.P.s' controls will rely. Those most frequently used are: temperature, duration, humidity etc.

For each measure, quantifiable criteria are defined (and therefore critical limits) which separate a "compliant" product from a "non-compliant" product. These criteria ensure that for a given C.C.P. the corresponding control measure is correctly applied. For example, a critical limit may be the authorised pesticide dose.

For safety reasons it is important to also set a target limit or a tolerance zone. A controlled product can be “compliant”, “acceptable” or “non-compliant”.

It may be necessary to determine several quantifiable criteria and therefore several critical limits for a single C.C.P.

2.9. Establishing a monitoring system for each C.C.P. (Principle 4)

The control operations need to be defined to ensure the critical limits are respected and therefore each C.C.P. is controlled. This involves answering the following questions: Who? does What? (which control) Where? When? How often? How?

These control methods can be formalised in the form of instructions or procedures and feature in the H.A.C.C.P. plan.

Keeping a record of these controls provides internal and external proof that the controls have really been carried out.

The controls are limited in their effectiveness by:

- Human capabilities with the risks of errors this can entail,
- The rarity of the hazard's occurrence: a hazard that appears very rarely will be more difficult to detect,
- The resources available: equipment, budget.

The H.A.C.C.P. team must optimise the frequency of the controls by first targeting the C.C.P.s linked to the most significant hazards and risks.

2.10. Establishing the corrective actions for each C.C.P. (Principle 5)

The corrective actions are implemented as soon as a C.C.P. control is lost or absent. They define the future of the non-compliant product and enable the C.C.P. control to be re-established.

2.11. Defining the verification methods (Principle 6)

Establish the methods used to check that the system is working correctly.

- Initial plan of analyses confirming that the hazard is controlled by applying the H.A.C.C.P. system,
- Validation of the initial study by an expert opinion,
- Final control (verification that all of the controls have been carried out),
- Annual plan of analyses,
- Rate of "non-compliant" control results compared to "compliant" results (very interesting in the case of mycotoxin or pesticide analyses),
- Internal or external audit etc.

The management must conduct a review at least once a year to verify the effectiveness of the H.A.C.C.P. system in place.

2.12. Establishing a documentation system (Principle 7)

The documentation system contains:

- The H.A.C.C.P. documents, referring to each of the stages (control plans, procedures, operating methods etc.) forming the HACCP plan,
- The records cited in the HACCP plan.

Generally, all of the documents produced within the context of the HACCP system must be stored and archived (reports of verification actions etc.).

APPENDIX 2

**PRODUCT
FACT SHEETS**

Cereals	Strengths in relation to the hazards studied Principal uses
<u>Oats</u>	<ul style="list-style-type: none"> • Hulled grain (glumes closed on the grain). <i>Use:</i> human food and animal feed
<u>Soft wheat</u>	<i>Use:</i> flour and starch industry, animal feed, malt industry, fermentation/alcohol
<u>Durum wheat</u>	<i>Use:</i> semolina production
<u>Maize</u>	<ul style="list-style-type: none"> • Large sized grain in relation to wheat and barley, which facilitates its ventilation. <i>Use:</i> corn milling, starch industries and animal feed
<u>Feed barley</u>	<ul style="list-style-type: none"> • Hulled grain (glumes that stick to the grain). <i>Use:</i> animal feed
<u>Brewing barley</u>	<ul style="list-style-type: none"> • Hulled grain (glumes that stick to the grain). <i>Use:</i> malt factories
<u>Buckwheat</u>	<ul style="list-style-type: none"> • Black very tough husk. <i>Use:</i> flour industry/human food
<u>Rye</u>	<i>Use:</i> flour industry/human food, animal feed
<u>Sorghum</u>	<ul style="list-style-type: none"> • Highly pigmented layer between the pericarp and the albumen (the “testa”) the absence or presence of which is a varietal characteristic. It seems to give the grains which have them mould resistant qualities. <i>Use:</i> animal feed
<u>Triticale</u>	<ul style="list-style-type: none"> • Very hard glumes which stick tightly to the grain. • Hardiness due to a cross between a wheat and a rye. This hardy characteristic makes it less sensitive to diseases. <i>Use:</i> animal feed

Oilseeds & Protein crops	Strengths in relation to the hazards studied Principal uses
<u>Pea, faba bean and lupin</u>	<ul style="list-style-type: none"> • The thick seed coat of the pea, horse bean and lupin seeds and their low fat content (pea, horse bean) ensure good storage of the grains. • The horse bean's tolerance to the <i>Aphanomyces</i> fungus of the pea (soil fungus). Moreover, its size allows for good ventilation during storage. <p><i>Use:</i> animal feed, human food (flour industry for the horse bean etc.).</p>
<u>Rape, soy, flax and sunflower</u>	<ul style="list-style-type: none"> • The thick seed coat of the rape, soy, flax and sunflower seeds and their low water content ensure good storage of the grains. <p><i>Use:</i> oilseeds-crushing industry, oil industry, animal feed</p>
<u>By-products</u>	<p>Products derived from cereals, and traded by the operator</p> <p><i>Use:</i> animal feed</p>

Sources:

- "Blé tendre", "Blé dur", "Riz", "Triticale" – ITCF collection.
- "Pois, lupins et féveroles", UNIP – ITCF collection.
- "Féverole de printemps et d'hiver", UNIP – ITCF collection.
- "Le petit livre jaune" – MAÏZ'EUROP.
- "La civilisation du maïs" – C. Labarde – Hachette.
- "Le sorgho". Maisonneuve et Larose publishing.
- "Colza", "Soja", "Tournesol" – CETIOM-PROLEA collection.

APPENDIX 3

STAGE
FACT SHEETS

Identification of the stage: RECEIPT**Purpose of the stage:**

- Receive, accept and store cereals, oilseeds and protein crops.
- Identify and characterise the products.
- Classify and allocate the products received.
- Anticipate any storage problems and allow for good storage conditions.

Main hazards identified:

- Receipt of a raw material presenting a physical, chemical or biological hazard.

Nature of the process (mechanical, thermal):

Mechanical.

Working staff (role, qualification):

1. Reception manager + fixed-term contract employees under his/her responsibility during the harvest period (sampling and analyses).
2. Silo manager and machinery operator + fixed-term contract employees (directing batches depending on the characteristics).

Materials entering and leaving (grains, impurities):

No separation of grains and impurities at this stage, except the most visible foreign bodies.

Environment (temperature conditions):

Ambient environment.

Equipment (location in the silo, characteristics):

- Vehicle.
- Sampler (sampling equipment or manual sampler).
- Collection pit with grating / flat storage platform.

Types and methods of controls carried out at this stage:

- Documents (member's delivery note).
- Control of the vehicle transporting the goods: visual (cleanliness of the vehicle, maintenance condition, closing system), smell.
- Sample taking.
- Visual and smell analysis.
- Specific analyses of the product.
- Any control applied must be validated to ensure they are effective. For example, this means demonstrating by analytical or other means that a statement made about a control is true and the control works as intended, in particular in relation to Directive No 2002/32, to Recommendation No.576/2006 as well as to regulation No.1881/2006. Records of this must be kept for future reference

Identification of the stage: PRE-STORAGE**Purpose of the stage:**

- Adjust the inflows in line with the drying capacities, while limiting the risk of alteration to the grain.

Main hazards identified:

- Development of mould.
- Development of field and/or storage mycotoxins.

Nature of the process (mechanical, thermal):

Mechanical.

Working staff (role, qualification):

Same staff as for receipt (logistics, time tracking).

Materials entering and leaving (grains, impurities):

No separation of the grains and impurities at this stage.

The product's water content

For example: * Maize: 22 – 45% (approximately 35% depending on the region),

* Rape: > 11%

* Wheat: > 16%

* Pea: >16%

Environment (temperature conditions):

Ambient conditions.

Equipment (location in the silo, characteristics):

- Handling (loader, chain conveyor, belt conveyor, bucket elevator, spiral conveyor).
- Storage bins/flat storage.

Types of controls carried out at this stage:

- Start date.
- End date. (notion of time, FIFO).
- Any control applied must be validated to ensure they are effective

Identification of the stage: DRYING**Purpose of the stage:**

- Bring the grain to a moisture level that allows it to remain well preserved during storage, while maintaining its technological properties.

Main hazards identified:

- Development of mould.
- Development of field and/or storage mycotoxins.

Nature of the process (mechanical, thermal):

Mechanical (pre-cleaning).

Thermal (drying).

Working staff (role, qualification):

Staff trained for drying.

Materials entering and leaving (grains, impurities):

- Material entering: goods presenting a humidity level higher than the standard, able to cause storage problems (moist grains at 35% on average + impurities).
- Material leaving:
 - From pre-cleaning: impurities + cleaned grains.
 - From the dryer: cleaned dry grains.

Environment (temperature, hygrometry conditions):

- High air temperature (70 – 130°C) and hygrometry (60 to 90%).

Equipment (location in the silo, characteristics):

- Lump breaker (removes the large impurities).
- Integrated dryer or external to the silo, single or multi-storey.
- Storage bin, dryeration unit, ventilators.
- Handling (bucket elevator, chain conveyor, belt conveyor, spiral conveyor etc.).

Types of controls carried out at this stage:

- Control of the grain's water content.
- Control of the grain and air temperatures.

Identification of the stage: STORAGE**Purpose of the stage:**

- Store the grains.

Main hazards identified:

- Development of mould and/or storage mycotoxins.
- Attracted insects.

Nature of the process (mechanical, thermal):

Mechanical.

Thermal (ventilation).

Working staff (role, qualification):

Staff trained in storage.

Materials entering and leaving (grains, impurities):

- Material entering: dry grains.
- Material leaving: cooled dry and possibly cleaned grains.

Environment (temperature conditions):

- Outside temperature by ventilation to lower the temperature of the stored grains.

Equipment (location in the silo, characteristics):

- Handling (bucket elevator, chain conveyor, belt conveyor, spiral conveyor).
- Storage bin/building.
- Size grading and cleaning machine + handling equipment.
- Ventilator.
- Temperature sensor.

Types of controls carried out at this stage:

- Thermometric controls.
- Visual or even olfactory controls.
- Any control applied must be validated to ensure they are effective

Identification of the stage: PESTICIDE TREATMENT**Purpose of the stage:**

- Prevent insects from being attracted (preventive treatments).
- Eliminate living insects (curative treatment).

Main hazards identified:

- The MRLs for storage pesticides are exceeded.
- Chemical contamination due to the persistence of residual fractions.

Nature of the process (mechanical, thermal):

Chemical.

Working staff (role, qualification):

Trained staff.

Materials entering and leaving (grains, impurities):

- Material entering: grains infested with insects.
- Material leaving: treated grains.

Environment (temperature conditions):

- Ambient environment.

Equipment (location in the silo, characteristics):

- Handling.
- Pesticide treatment equipment.

Types of controls carried out at this stage:

- Sample taking.
- Visual control.

Identification of the stage: PREPARATION RELEVANT TO THE CONTRACTUAL REQUIREMENTS
<p>Purpose of the stage:</p> <ul style="list-style-type: none"> • Provide the customer with batches of goods that comply with the regulatory and contractual specifications.
<p>Main hazards identified:</p> <ul style="list-style-type: none"> • Batch allocation error. • Chemical or biological contamination of a batch by a product presenting a physical, chemical or biological hazard, or by the handling and storage equipment. • Accidental mixing of goods.
<p>Nature of the process (mechanical, thermal): Mechanical.</p> <p>Working staff (role, qualification): Trained staff.</p> <p>Materials entering and leaving (grains, impurities):</p> <ul style="list-style-type: none"> • Material entering: stored grains. • Material leaving: <ul style="list-style-type: none"> - grains prepared in accordance with the contractual specifications required, - grains separated by sorting (small grains, tailings etc.), - residues and vegetable matter. <p>Environment (temperature conditions):</p> <ul style="list-style-type: none"> • Ambient environment. <p>Equipment (location in the silo, characteristics):</p> <ul style="list-style-type: none"> • Handling (elevator, chain conveyor, belt conveyor, spiral conveyor). • Circuit weighing machine. • Bin or hopper, size grading machine, cleaner-separator. <p>Types of controls carried out at this stage:</p> <ul style="list-style-type: none"> • Sample taking. • Specific analyses linked to the contract.

Identification of the stage: DISPATCH - DELIVERY**Purpose of the stage:**

- Transport the goods to the transfer of ownership location in compliance with the quality and quantity requirements, the delivery deadline and address.

Main hazards identified:

- Loading error.
- Chemical or biological contamination by the dispatch – delivery equipment.

Nature of the process (mechanical, thermal):

Mechanical.

Working staff (role, qualification):

- Qualified staff.
- Dispatch/laboratory manager, cereal or trading manager.
- Approver if leaving.
- Qualified transport driver, farmer aware of the hygiene rules, boat man.

Materials entering and leaving (grains, impurities):

- Goods prepared in accordance with the market demands.

Environment (temperature, hygrometry conditions):

- Ambient environment.

Equipment (location in the silo, characteristics):

- Hopper,
- Handling,
- Circuit weighing machine,
- Sampler,
- Vehicle:
 - ✓ Lorry:
 - grain carrier truck (27t), lift and carry container (12 to 13 t), bottom-dump skip, lock skip, tank, tautliner, container
 - semi-trailer, fixed or mobile skip carrier, road trailer carrier + fixed or mobile trailer
 - ✓ Train: specialised tank with hatches, opening and closing system,
 - ✓ Canal-boat or barge with a wooden or metallic bottom, one or several skids and loading hatches/hatch covers.
- Sheltered or unsheltered loading.

Types of controls carried out at this stage:

- Control of the vehicle: visual (cleanliness of the vehicle, maintenance condition, closing system), smell.
- Sampling.
- Analysis as per the contract.
- Visual control of the goods (insects, smell).
- Control of the documents (nature of the previous load, corrective actions).
- Any control applied must be validated to ensure they are effective. For example, this means demonstrating by analytical or other means that a statement made about a control is true

and the control works as intended, in particular in relation to Directive No 2002/32, to Recommendation No.576/2006 as well as to regulation No.1881/2006. Records of this must be kept for future reference

APPENDIX 4

**THE HAZARD
FACT SHEETS**

List of the hazards

The different hazards dealt with in this guide, which can be controlled by hygiene practice indicators and/or the HACCP study are the following:

HAZARD	HAZARDOUSNESS	ORIGIN OF THE HAZARD	MECHANISMS AT THE ORIGIN OF THE HAZARD	METHODS OF PREVENTING THE HAZARD	HACCP STUDY
Allergens	Toxicity	Fa: Raw materials OP: Equipment used Staff	Cross contaminations	Staff awareness raising Maintenance of the equipment	
<i>Bacillus cereus</i>	Toxicity	Fa: Raw materials Soil Env: Dust	Temperature increase – Condensation phenomenon	Ventilation – Cleaning of grains – Cleaning of the site	
Foreign bodies	Hygiene practice indicators	Fa: Raw materials OP: Equipment used Staff	Lack of awareness Maintenance defect	Staff awareness raising Maintenance of the equipment Cleaning of the grain	
Dioxins	Toxicity	Fa: Fuel oil dryer without heat exchanger Env: Atmospheric pollution	Proximity of a polluting site	Risk analysis and Monitoring plan if necessary	
Ergot	Toxicity	Fa: Raw materials supplied contaminated	Presence of sclerotia in the field (soil) + rainy, humid and cool weather	Recommendations of farming methods to farmers, Cleaning of the grain	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)	Toxicity	Fa: Raw materials supplied contaminated	Fuel oil dryer without heat exchanger	Farmer and staff awareness raising	
Insects and dust mites	Alteration of the stored foodstuffs	Fa: Contaminated raw materials OP: Contaminated equipment	Increase in storage temperature Condensation phenomenon	Staff awareness raising Cleanliness of the equipment Cooling ventilation	Yes
Heavy metals	Toxicity	Fa: Raw materials Env: Atmospheric pollution, Soil pollution	Accumulation Proximity of a polluting site	Monitoring plan Farmer awareness raising	
Moulds including bunt	Alteration of the stored foodstuffs	Fa: Raw materials supplied contaminated OP: Poor storage methods and conditions	Condensation Increase in storage temperature Pre-storage too long	Ventilation – Cleaning of the grains Appropriate pre-storage duration Recommendations of farming methods to farmers	Yes
Mycotoxins	Toxicity	Fa: Raw materials supplied contaminated OP: Poor storage methods and conditions	Increase in storage temperature Condensation phenomenon Pre-storage too long	Ventilation – Cleaning of the grains Temperature monitoring Appropriate pre-storage duration	Yes
Radioactivity	Toxicity	Env: Atmospheric pollution, Soil pollution	Proximity of a polluting site	Risk analysis and Monitoring plan if necessary	
Pesticide residues	Toxicity	OP: Pesticide treatment equipment leak, incorrect settings, unsuitable treatment, overdose etc.	Maintenance defect Lack of awareness Barn storage awareness	Maintenance of the equipment Staff awareness raising	Yes
Rodents and fowl and/or their macroscopic traces	Hygiene practice indicators	OP: Poor maintenance of premises and their surroundings	No protection of premises or measures to combat the problem	Measures for protecting the premises (nets, doors etc.) and preventive measures	
Salmonellas	Toxicity and hygiene practice indicators	OP: Pests Personal hygiene	Presence of vectors	Staff awareness raising Protection of premises and their surroundings	

NB:

- the word staff is understood to mean the staff of the company or any other contributor
- Origin of the hazard: Fa = farmer – OP = Operator – Env. = environment

Each operator must conduct a study of the hazards linked to its outlets and its environment to ensure the food and feed safety of the products sold. Some of the hazards in this list may not be taken into account while others might be added.

With regard to pesticide residues other than storage pesticide residues, heavy metals, foreign bodies, dioxins, pathogenic flora, rodents and fowl, allergens and radioactivity, their relative risk is not specific to a given stage in the process; they are dealt with using general hygiene rules.

HAZARD FACT SHEETS

These sheets present the different hazards referred to in this guide, either because they are pathogenic and/or toxigenic, because they alter the foods stored, or because they are indicators of hygienic practices. For the purpose of clarity and to provide an overview, each hazard sheet contains the following information: nature, origin, characteristics, development conditions and applicable regulations when they exist.

There are three types of hazard:

Physical hazard

- Foreign bodies

Chemical hazards

- Heavy metals
- Residues from storage pesticides
- Dioxins

Biological hazards

- Insects and dust mites
- Rodents and fowl and/or their macroscopic traces
- Mould
- Mycotoxins
- Salmonellas
- *Bacillus cereus*

FOREIGN BODIES

Nature of the hazard

Physical hazard

Classification

Level of impurities is one of the qualitative criteria in commercial contracts. Four types of impurities are distinguished:

- Broken grains
- Impurities constituted by the grains
- Sprouted grains
- Miscellaneous impurities

The “foreign bodies” category belongs to this final type of impurity.

The main foreign bodies:

- Glass
- Plastic
- Particles of metal
- Pebbles, stones
- Plant debris
- Wood
- Soil
- Sand

Origin

- Raw materials supplied
- Maintenance of the equipment
- Loss of objects by staff

Food and feed safety risks

The presence of foreign bodies can cause risks to:

- The consumer’s safety (cut by glass)
- Their food and feed safety (transmission of bacteria)

Sources

- Guide de bonnes pratiques d’hygiène – Brasserie.
- Guide de bonnes pratiques d’hygiène – Industrie de la semoulerie de blé dur.
- Guide de bonnes pratiques d’hygiène – Malterie.
- Guide de bonnes pratiques d’hygiène – Meunerie.
- ITCF (1995) – Contrôle de la qualité des céréales et des protéagineux, guide pratique.

HEAVY METALS (lead, cadmium, mercury)

Nature of the hazard:

Chemical hazard

Classification

The term “heavy metals” is used in everyday language, but it actually refers to mineral trace elements (MTE). They are normally present in the environment as traces (< 100 mg/kg). MTEs are mainly metallic (although some such as arsenic and selenium are not). The majority are trace elements, that is, in small concentrations they are necessary to sustain life. However, lead and cadmium are not essential to sustaining life. They are toxic metallic contaminants.

Origin

They can be found in the form of trace elements in grains and their by-products following atmospheric pollution (lead) or soil pollution (cadmium).

Food and feed safety risks

Lead and cadmium are toxic above a certain concentration and can accumulate in the body.

Regulations

Concerning **foodstuffs**, Regulation (EC) no. 1881/2006 of 19 December 2006 sets the following maximum levels expressed in relation to fresh weight:

- **Lead:** 0.2 mg/kg of cereals including buckwheat and legumes
- **Cadmium:**
 - 0.1 mg/kg: cereals excluding bran, wheat germ, wheat grain and rice
 - 0.2 mg/kg: bran, wheat germ, wheat grain, rice and soya seeds

Concerning raw materials for **animal feed** of plant origin, the Order of 12 January 2001 (OJ of 20/01/2001) in view of Council Directive 2002/32/EC, sets the following maximum levels:

- **Lead:** 10 mg/kg
- **Cadmium:** 1 mg/kg
- **Mercury:** 0.1 mg/kg

Sources

- Chaussod, R. (2000) – Boues de stations d'épuration et métaux lourds, INRA.

STORAGE PESTICIDE RESIDUES

Nature of the hazard:

Chemical hazard

Classification

An pesticide is any substance used to combat the presence or appearance of insects and mites in stored grains.

Origin

- Raw materials supplied
- Pesticide treatment
- Pesticide treatment equipment

Food and feed safety risks

Toxicity above the regulatory concentration threshold.

Regulations

Characteristics of the active materials approved for the treatment of stored cereals.

Only aluminium and magnesium phosphide are approved for pesticide treatment of stored oilseeds. Nevertheless, there is an MRL for the following pesticides:

Pesticide active material	Authorized dose in substance (g/ t)	Persistence or duration of the product's action after application	Maximum Residue Limit (mg/ kg)	Maximum Residue Limit (mg/ kg)
			<u>Cereals</u>	<u>Oil and protein seeds</u>
Bifenthrin			Oats, triticale, barley: 0.5 Other: 0.05	Oilseeds: 0.1 Protein seeds: 0.05
Malathion (can be used until 01/12/2008)	8	< 3 months	8	-
Pirimiphos-methyl	4	> 6 months	5	0.05
Chlorpyrifos-methyl	2.5	> 6 months	3	0.05
Deltamethrin	0.5-1	> 6 months	2	0.05 for oilseeds (0.1 for rape and 1.0 for protein crops)
Natural pyrethrins			3	protein crops: 1
Aluminium or magnesium phosphide	2	No persistence	0.1	0.1 for oilseeds and peas

- Reg. (EC) 149/2008
- Reg. (EC) 396/2005

Sources

- FFCAT (1995) – Le guide du chef silo. Les bonnes pratiques du stockage des grains.
- INRA (2002) -Base de données concernant les substances actives phytopharmaceutiques: "www.inra.fr/agritox".
- Periquet, A. (1995) – Résidus des traitements phytosanitaires dans les denrées alimentaires: exposition et toxicité. Dans *Sécurité alimentaire du consommateur*, Moll, M.

and Moll, N., éd. Techniques et Documentation Lavoisier, Paris, pp 209-243. ISBN 2-85206-994-6.

DIOXINS

Nature of the hazard

- Chemical hazard

Classification

Dioxins are Persistent Organic Pollutants (POP) that are found worldwide in any environment (ubiquitous molecules). The term “dioxins” therefore encompasses 210 congeners. They are comprised of two major categories of chlorinated tricyclic aromatic compounds: polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs). They are molecules which can only be destroyed at a very high temperature (they are chemically and thermally stable). Moreover, they are very lipophilic (soluble in fats) and not very biodegradable. They therefore accumulate along the food chains (bioaccumulation).

Origin

Dioxins are released from industrial atmospheric waste and certain combustion processes. They are found in soils and in water.

[Direct drying can pose a significant risk to feed \(and food\) safety in regard to dioxins when improper fuel is used in the process or due to poor maintenance of the dryer\).](#)

Food and feed safety risks

- The term “dioxins” encompasses 210 congeners. Among them, 17 congeners are toxic, although they do not all possess the same toxicity. To translate this difference, a toxic equivalence factor (I – TEF) has been defined (each toxin is weighted by a factor compared to the factor of 1 allocated to the most toxic dioxin).
- The toxicity of a sample is quantified by the quantitative measurement of the 17 toxic congeners to which the toxic equivalence factors are applied. This shows a sample's Toxic Equivalent Level or I – TEQ.

Regulations

Concerning materials intended for animal feed of plant origin, the Order of 12 January 2001 (OJ of 20/01/2001) in view of Council Directive 2002/32/EC, sets the following maximum level for feed raw materials of plant origin, including vegetable oils and their by-products: 0.75 ng WHO-PCDD/F-TEQ/kg.

Sources

- Germain, I – Note d'information sur l'analyse des dioxines, IFRA.

INSECTS AND DUST MITES

Nature of the hazard

Biological hazard

Classification

Insects and mites belong to the branch of arthropods which are characterized by the presence of quite a rigid cuticle covering the body. Insects bring about an alteration in grains and are sources of soiling and contamination. Mites mainly feed on grain debris or mould. It is not always possible to detect a batch contaminated by insects. Certain insects such as weevils develop inside the grains.

The main insects and mites found in stored grains:

- Insects

Grain weevil, rice weevil, tribolium castaneum, tribolium confusum, oryzaephilus surinamensis, cryptolestes, lesser grain borer, khapra beetle, wheat beetle, dried fruit moth, angoumois grain moth.

- Mites

Flour mite, rapeseed mite, hairy mite, Cheylet.

Origin

- Equipment (storage and handling facility)
- Raw materials supplied

Development factors in stored cereals

- Temperature
- The grains' water level

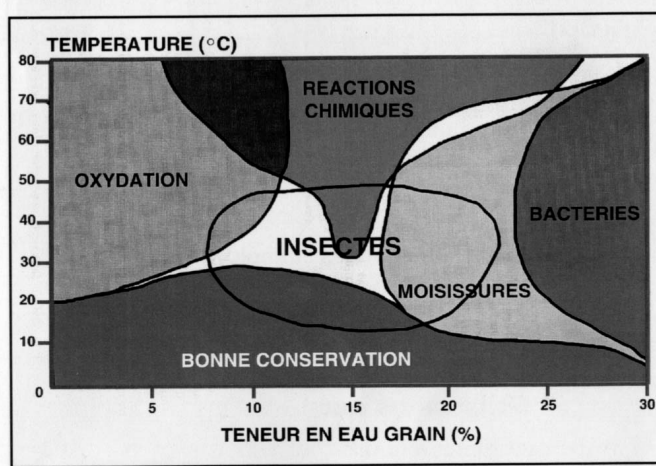
Survival of insects

- At a threshold of less than 12°C, the insects cease to develop.
- Subjected to a temperature lower than 5°C for several weeks, the insects die.
- Exposed to a temperature of 60°C for 3 minutes, the insects are destroyed.

Survival of mites

- For low temperatures, there are very large sensitivity differences between the various mite species.
- For high temperatures, exposure to a temperature of 45°C for 5 hours kills all species.

The graph below shows the risks a mass of cereals is subject to according to its temperature and water level:



FRENCH	ENGLISH
REACTIONS CHIMIQUES	CHEMICAL REACTIONS
OXYDATION	OXIDATION
INSECTES	INSECTS
BACTERIES	BACTERIA
MOISSURES	MOULDS
BONNE CONSERVATION	GOOD STORAGE
TENEUR EN EAU GRAIN (%)	GRAIN WATER LEVEL (%)

*Francis Fleurat-Lessard and Bernard Cahagnier
INRA – Villenave d’Ornon and Nantes*

Food and feed safety risks

Germ carriers.

Sources

- Coop De France - Métiers Du Grain-Service Technique.
- INRA de Bordeaux.
- ITCF (Institut Technique des Céréales et des Fourrages) (1995) – *Contrôle de la qualité des céréales et protéagineux. Guide pratique*, 253 p.
- Scotti, G. (1978) – *Les insectes et les acariens des céréales stockées*. Afnor/ ITCF, Paris, 238 p. ISBN 2 12 352 808 0.

RODENTS, FOWL AND/OR THEIR MACROSCOPIC TRACES

Nature of the hazard

Biological hazard

Classification

By consuming grains, rodents and fowl cause damage, soiling, contamination and alteration of the grains.

- The rodents likely to attack stored grains are rats, mice and field mice.
- As regards fowl, it mainly concerns pigeons and sparrows.

Origin

Poor maintenance or protection of:

- Premises
- External surroundings

Food and feed safety risks

Germ carriers.

MOULD

Nature of the hazard

Biological hazard

Classification

- Moulds represent a group very heterogeneous of about 11 000 species of which almost 100 able, potentially, to produce mycotoxins. These toxicological species can be grouped in the classes of Deuteromycota and Ascomycota.. They are found in all classes of fungi.
- Moulds grow a number of spores (dissemination mechanisms) which have a high longevity. These spores are disseminated by air or water and colonize new substrata.
- When the mould's growth is sufficiently advanced, it forms a mycelium (generic term used to refer to all of the filaments forming the vegetative part of fungi) that is visible to the naked eye.
- Non-photosynthetic, mould can only grow on organic media, causing damage, changing their appearance or causing organoleptic alterations.

Types forming field fungi

The most common types are *Alternaria*, *Fusarium*, *Helminthosporium*, *Epicoccum*, *Septoria* and *Verticillium*; this flora which requires humidity to develop normally regresses in stored grains.

Types forming intermediate fungi

Mucorales like *Rhizopus*, *Absidia* and *Mucor* and certain yeasts: these types largely predominate in specific conditions and mainly in grains that are not dry enough.

Types forming storage fungi

Mainly *Aspergillus* and *Penicillium*.

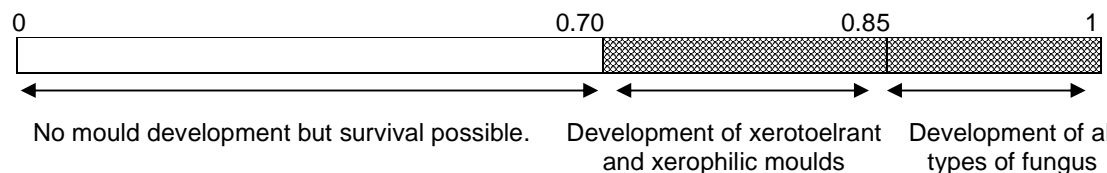
Origin

- Raw materials supplied
- Storage methods and conditions
- Equipment (storage and handling facility)

Development factors

Physical conditions influencing the growth of mould in stored cereals:

- The relative humidity which can be compared to the grain's humidity. An increase in the grains' water level activates the growth of mould.
- The activity of water (Aw) which is equal to the relative humidity divided by 100.



▪ Temperature

The majority of moulds have growth optimums between 25 and 35°C and react to a rise in temperature by accelerating their growth.

▪ pH

Mould grows between pH 2 and pH 11.

Chemical conditions influencing the growth of mould in stored cereals:

- The composition of the atmosphere

The lower the oxygen composition of the atmosphere, the lower the growth rate of moulds, which are aerobic organisms. However, the oxygen level is unlikely to fall low enough to slow down the growth of mould.

Food and feed safety risks

Moulds present no direct food and feed safety risk.

Regulations

- No specific regulations.

▪

Sources

- Cahagnier, B. (2000) - Microbiologie des céréales et dérivés, problématique de la conservation des grains et graines, moisissures et qualité. *Document de cours IST 3*, 54 p.
- Cahagnier, B. (2000) - Morphologie et taxonomie des moisissures. *Document de cours IST 3*, 58 p.
- Richard – Molard, D. (1991) – Microbiologie des céréales et farines. Dans Les industries de première transformation des céréales, Godon, B. et Willm, C., eds, Technique et Documentation – Lavoisier, Paris, pp 177 – 191, ISBN 2 85206 610 6.

MYCOTOXINS

Nature of the hazard

- Biological hazard

Classification

- Mycotoxins are “secondary metabolites” produced by certain moulds. They are molecules which have a very low molecular weight; they are not proteinic and do not therefore cause immunological reactions.
- They are natural contaminants in foods and animal feed. They resist all treatments, sterilization, oxidation, acidity and alkalinity and have a lifespan in the contaminated product that is a great deal longer than that of the mould which synthesized them. However, not all moulds produce toxins and not all strains of the species that are able to, do so systematically, even if all of the conditions optimal to toxin production are combined.

Field mycotoxins

Mycotoxins	Moulds	Main media
Trichothecenes	<i>Fusarium</i>	Maize, barley, wheat, oats
Zearalenone	<i>Fusarium graminearum</i>	Maize, wheat, sorghum
Fumonisin	<i>Fusarium moniliforme</i>	Maize

Storage mycotoxins

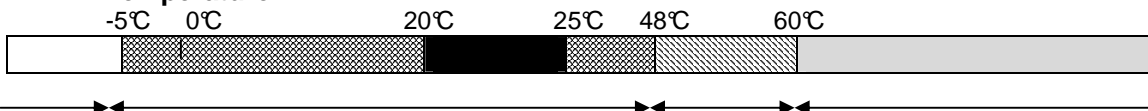
Mycotoxins	Moulds	Main media
Ochratoxins	<i>Aspergillus ochraceus</i> <i>Penicillium viridicatum</i>	Maize, barley, wheat
Citrinin	<i>Penicillium citrinum</i>	Barley, rye, oats, maize
Sterigmatocystin	<i>Aspergillus versicolor</i>	Wheat
Aflatoxins	<i>Aspergillus parasiticus</i> <i>Aspergillus flavus</i>	Maize, sorghum

Origin

- Raw materials supplied
- Storage methods and conditions

Development factors

- Temperature



Development slows down then stops but survival. Mycotoxin synthesis stops.

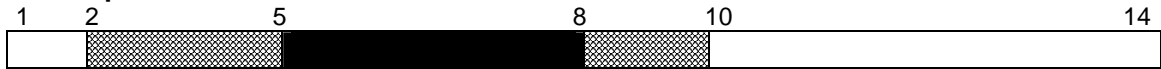
Development of moulds and production of mycotoxins.

Mould development slows down. Mycotoxin synthesis stops.

Mould extermination starts.

Mycotoxins are not very sensitive to heat, they are resistant to all the heat treatments currently used in the food-processing industries.

▪ **pH.**



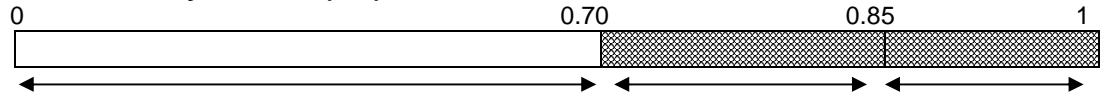
No possible development of moulds but survival possible. Mycotoxin synthesis stops

Possible development of moulds and production of mycotoxins.

No possible development of moulds but survival possible. Mycotoxin synthesis stops

Mycotoxins are stable, regardless of the pH.

▪ **The activity of water (Aw)**



No development of moulds but survival possible. Mycotoxin synthesis stops.

Development of xerotolerant and xerophilic moulds.

Development of all moulds and production of mycotoxins.

The greater the grains' Aw the higher the mycotoxin production even for species classed as xerotolerant or xerophilic.

Food and feed safety risks of aflatoxins and ochratoxins

- Nephrotoxicosis
- Carcinogenesis
- Immunosuppressant

Regulations

- The mixing of products compliant with the set maximum levels for mycotoxins with non-compliant products is prohibited.

- Maximum mycotoxin levels for **foodstuffs: cereals intended for human consumption**:
(basic text: Regulation (EC) no. 1881/2006 of 19 December 2006 as amended)
 - Aflatoxins:
Concerning cereals and oilseeds (excluding maize):
 - 2 µg/ kg for aflatoxin B1,
 - 4 µg/ kg for the total of the aflatoxins (B1+B2+G1+G2).
 Concerning maize to be subjected to sorting or other physical treatment before direct human consumption or use as an ingredient in foodstuffs:
 - 5 µg/ kg for aflatoxin B1,
 - 10 µg/ kg for the total of the aflatoxins (B1+B2+G1+G2).
 - Ochratoxin A:
 - 5 µg/kg for unprocessed cereals (including untreated rice and buckwheat),
 - 3 µg/kg for cereal by-products (including processed cereal products and the grains of cereals intended for direct human consumption).
 - Deoxynivalenol:
 - 1250 µg/kg for unprocessed cereals other than durum wheat, oats and maize,
 - 1750 µg/kg for durum wheat, oats and maize (with the exception of unprocessed maize intended to be processed by wet milling).
 - Zearalenone:
 - 100 µg/kg for unprocessed cereals other than maize,
 - 350 µg/kg for maize (with the exception of unprocessed maize intended to be processed by wet milling).
 - Fumonisin:
 - 4000 µg/kg for maize (with the exception of unprocessed maize intended to be processed by wet milling)
 - 1000 µg/kg for maize intended for direct human consumption.
- Maximum mycotoxin levels for **cereals intended for animal feed** (basic text: Amended Directive 2002/32 of the European Parliament and of the Council of 07 May 2002)
 - Aflatoxin B1:
 - 0.02 mg/kg for all feed materials
- Recommended maximum mycotoxin levels **for cereals intended for animal feed** (**Commission Recommendation of 17 August 2006**):
 - Deoxynivalenol: 8 mg/kg for all cereals
 - Zearalenone: 2 mg/kg for all cereals
 - Ochratoxin A: 0.25 mg/kg for all cereals
 - Fumonisin B1 + B2: 60 mg/kg for all cereals

Sources

- Cahagnier, B. (2000) – Les mycotoxines. *Document de cours IST 3*, 36 p.
- Guide de bonnes pratiques hygiéniques de l'Industrie de la semoulerie de blé dur.

SALMONELLAS

Nature of the hazard

Biological hazard

Classification

Salmonellas are bacteria that belong to the family of Enterobacteria, which are pathogenic for humans and animals.

Salmonellas have characteristics which explain their very widespread distribution:

- They are carried by a large range of hosts (humans, mammals, birds, reptiles, insects etc.).
- They have a very high survivability in the environment.

From an epidemiological point of view salmonellas can be classed into three main groups:

- Strains that only infect humans and are responsible for typhoid fever with septicaemic dissemination, which are not pathogenic for other animal species.
- Strains specifically adapted to particular species of vertebrates (poultry, sheep etc.), some of which are pathogenic for humans.
- Strains that do not have a specific preferred host and infect both humans and animals. This is the reservoir in which the main agents of the salmonellas currently encountered are found.

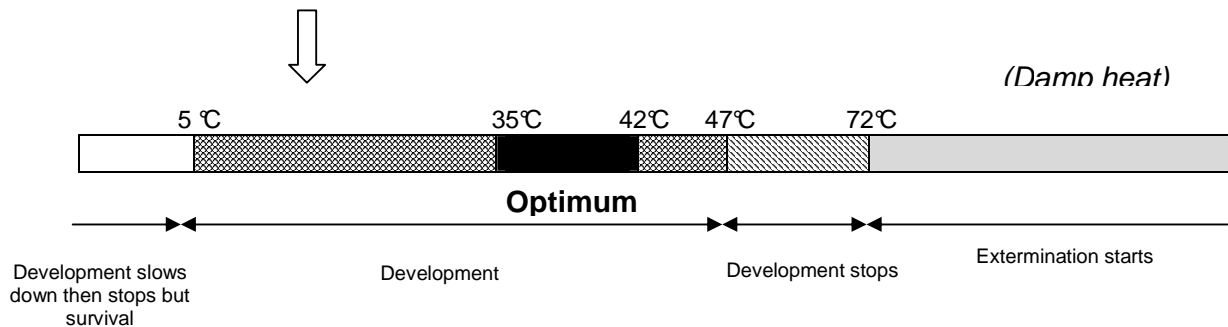
Origin

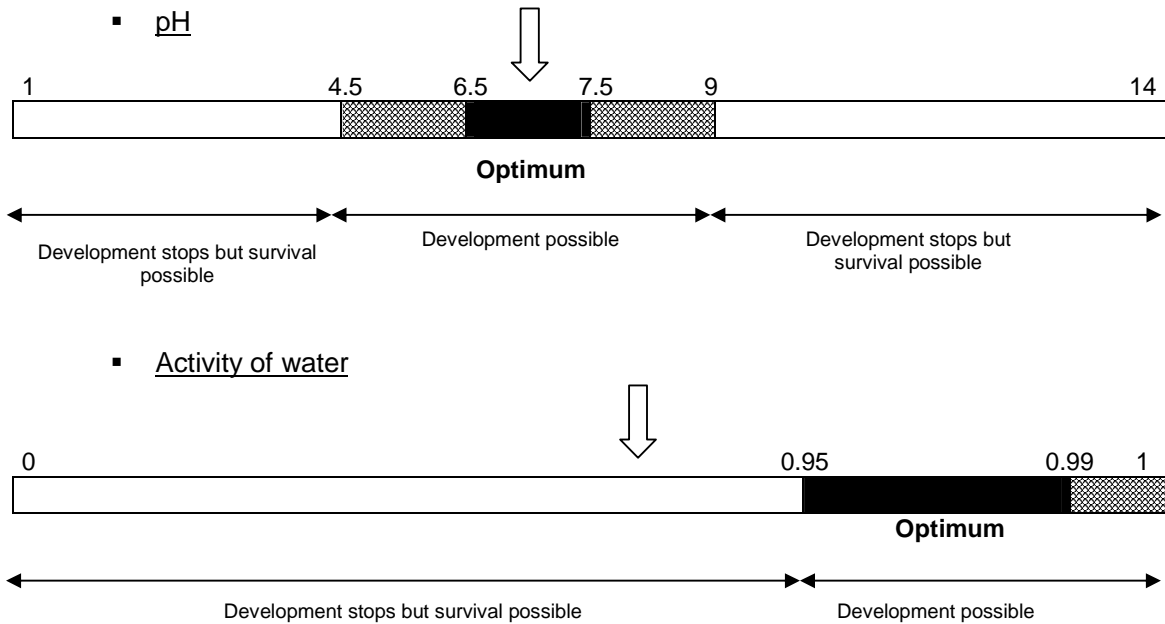
- Pests
- Staff hygiene

Development factors

- Temperature

Salmonella is sensitive to heat.





Food and feed safety risks

Mainly intestinal disorders.

Sources

- Guide de bonnes pratiques hygiéniques – Meunerie.
- Guide de bonnes pratiques hygiéniques de l'Industrie de la semoulerie de blé dur.
- McCullough, N.B. and Eisele, C.W., 1951a. Experimental human salmonellosis. Pathogenicity of strains of *Salmonella meleagridis* and *Salmonella anatum* obtain from spray-dried whole egg. *J. Infect. Dis.*, **88**, 278-289.
- McCullough, N.B. and Eisele, C.W., 1951b. Experimental human salmonellosis. III. Pathogenicity of strains of *Salmonella newport*, *Salmonella derby* and *Salmonella bareilly* obtained from spray-dried whole egg. *J. Infect. Dis.*, **89**, 209-213.
- Sécurité alimentaire du consommateur. M. Moll et N. Moll. 95. Technique et Documentation – Lavoisier. ISBN 2-85206-994-6. 300 p.

BACILLUS CEREUS

Nature of the hazard

Biological hazard

Classification

- *Bacillus cereus* belongs to the family of Bacillaceae, formed of bacilli which produce heat resistant spores. It is pathogenic for humans and animals. This micro-organism is frequently found in products rich in starch (rice, cereals etc.).
- *Bacillus cereus* is capable of producing two types of toxins one of which is heat stable. It is responsible for food poisoning due either to ingestion of the preformed toxin in the food, or ingestion of the bacterium.
- *Bacillus cereus* produces spores which give it a high survivability (form of heat, pressure and low Aw etc. resistance).

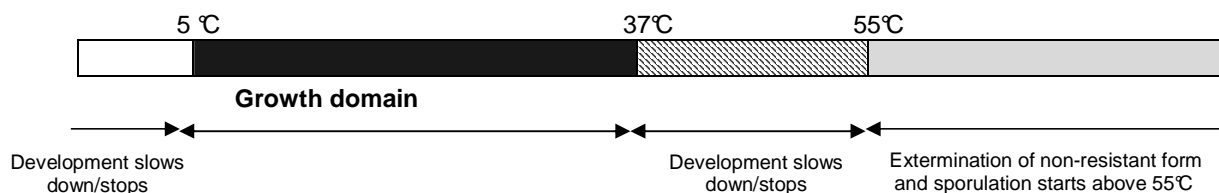
Origin

- Dust
- Soil
- Raw materials supplied

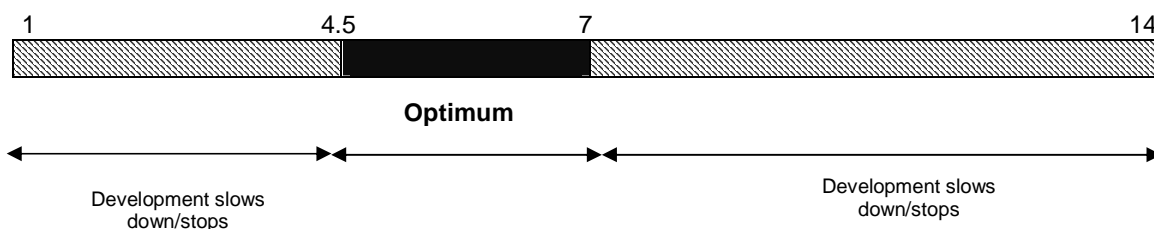
Factors in the development of *Bacillus cereus* and toxin production

- Temperature

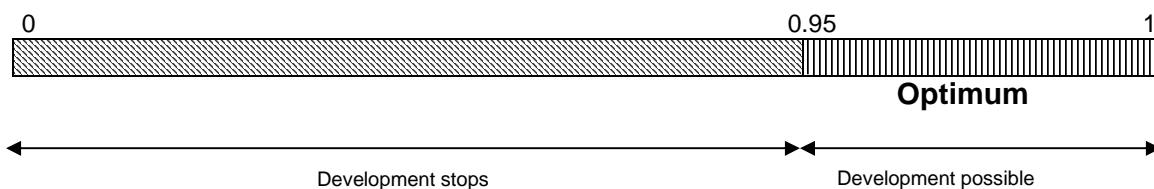
Certain strains are capable of multiplying in the cold.



- pH



- Activity of water (Aw)



Food and feed safety risks

Gastrointestinal disorders.

Sources

Guide de bonnes pratiques hygiéniques de l'Industrie de la semoulerie de blé dur.

APPENDIX 5

ESTABLISHING THE SCALES FOR ANALYZING HAZARDS

Appearance scale

NOTE	CRITERIA
1	Practically non-existent. The likelihood of the hazard being present is very small and has never occurred to date.
2	Possible. An occasional defect or fault has appeared in the past. If the product's control is poor at this point, the hazard will only be present in one part of a single batch.
3	Common. The hazard is regularly present. If the product's control is poor at this point, the hazard will be present in an entire product batch.
4	Certain. The hazard is always present. If the product's control is poor at this point, the hazard will affect several product batches.

Detection scale

NOTE	CRITERIA
1	The hazard can always be detected during controls.
2	The hazard is detected most of the time during controls carried out. A few defects may escape detection but will be systematically located before the product is released (dispatch).
3	A large proportion of defects will not be detected during controls but the majority will be located during the product's release (final control before dispatch).
4	The hazard is not apparent. The hazard requires significant investigations in order to be detected.

Severity scale

The severity of a hazard corresponds to the significance of its consequences.

NOTE	CRITERIA
1	Minor severity: Consumption of the hazardous product may have a negative effect on the product's taste but does not affect the consumer's food and feed safety. Where regulatory thresholds have been set, the results from analyses show zero or low values.
2	Medium severity: Consumption of the hazardous product may have a slight effect on the consumer's food and feed safety (sensitive people) if subject to prolonged exposure to the hazard. Where regulatory thresholds have been set, the results from analyses show low values.
3	Critical severity: Consumption of the hazardous product may affect the consumer's food and feed safety (although without the need for hospitalization) if subject to prolonged exposure to the hazard. Where regulatory thresholds have been set, the results from analyses are close to the maximum levels.
4	Catastrophic severity: Consumption of the hazardous product may cause serious food and feed safety problems (hospitalization, death) for some people (or the entire population). Where regulatory thresholds have been set, the results from analyses are higher than the regulatory standards.

APPENDIX 6

HAZARD ANALYSIS TABLES

GOOD HYGIENE PRACTICES GUIDE

Stage: **RECEIPT**

Product Oilseeds						Recommended preventive measures
Hazard	Causes of the hazard	Hazard analysis				
		G	F	D	R	
Ergot	Receipt of contaminated goods	3	1	2	6	Advisory approach with farmers (use of certified seeds or graded farm seeds, compliance with the good practices guide for field crops). Carry out controls on receipt – Train staff in detecting ergot.
Moulds including bunt	Contaminated goods:					Choose a variety adapted to its environment.
	Receipt from a storage crib (maize)	1	2	2	4	Advisory approach with farmers (crib drying, ripeness, previous crop, cultivation (labour), phytosanitary protection), compliance with the good practices guide for field crops.
	Receipt of wet goods (inflows)	1	2	1	2	Adjust the threshing equipment (broken seed problem).
Mycotoxins <i>Fumonisin, DON, Zearalenone</i>	Receipt of contaminated goods					Carry out controls on receipt and make corrective action decisions.
	Receipt of wet <u>goods</u> (inflows)	1	2	2	4	Train staff in detecting bunt.
	Contaminated <u>material</u> : Receipt of <u>contaminated goods</u> Receipt from a storage crib					Advisory approach with farmers (variety chosen, previous crop, cultivation (labour), phytosanitary protection, ripeness, harvest date, crib drying, storage, cleaning / maintenance of the equipment etc.). Combat borer insects to limit the development of fumonisins. Comply with the good hygiene practices guide for field crops.
Ochratoxin A	Receipt of wet <u>goods</u> (inflows)	3	2	4	24	Raise farmers' awareness on controlling their storage.
	<u>Goods</u> contaminated following barn storage Receipt from a storage crib	3	2	4	24	

GOOD HYGIENE PRACTICES GUIDE

Stage: **RECEIPT**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Insects</u>	<p>Infested goods:</p> <p>Goods delivered during harvest time</p> <p>Goods delivered outside harvest time</p> <p>Infested equipment:</p> <p>Pit</p> <p>Transport equipment (farmer, collection/storage organizations, service provider)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>1</p>	<p>2</p> <p>2</p> <p>3</p> <p>3</p> <p>3</p>	<p>2</p> <p>4</p> <p>3</p> <p>3</p> <p>3</p>	<p>Train silo staff in insect detection.</p> <p>Increase the farmer's awareness on controlling his storage.</p> <p>Controls on receipt.</p> <p>Cleaning of the operator's pits and transport equipment. Increase silo staff's awareness on cleaning the pits. (Pesticide treatment on the pits).</p> <p>Increase the farmer's and driver's awareness on cleaning the transport equipment.</p>
<u>Residues from storage pesticides</u>	<p>Goods already treated by the farmer or collection/storage organization (transfer):</p> <p>Goods delivered during harvest time</p> <p>Goods from storage</p> <p>Goods treated with an unapproved product (e.g. oilseeds)</p>	<p>3</p> <p>3</p> <p>3</p> <p>3</p>	<p>1</p> <p>2</p> <p>1</p> <p>1</p>	<p>4</p> <p>4</p> <p>4</p> <p>4</p>	<p>12</p> <p>24</p> <p>12</p>	<p>Monitoring/recording of treatments on the delivery note.</p> <p>Training and awareness raising for silo staff and farmers on approved treatment methods and their consequences.</p>

G severity index

F frequency of appearance index

D detection index

R risk or criticality = G * F * D

COCERAL/COGECA

Version 20 July 2010

GOOD HYGIENE PRACTICES GUIDE

Stage: **PRE-STORAGE**

Product Oilseeds		Hazard analysis				Recommended preventive measures
Hazard	Causes of the hazard	G	F	D	R	
<u>Moulds</u>	<p>Method: Too long storage duration of a contaminated good with a high humidity level and/or high % of broken grains or level of impurities) e.g. for maize with a humidity level > 30 - 32% > 72 hr</p>	1	2	3	6	<p>Organization of the harvests. Management of the time periods between collection and drying. Rotation of hoppers or pre-storage areas (FIFO – First In First Out principle). Management of the dryers. Raise contractors', farmers' and employees' awareness on the harvest time.</p>
<u>Mycotoxins</u>	<p>Method: Too long storage duration of a contaminated good with a high humidity level and/or high % of broken grains or level of impurities) e.g. for maize with a humidity level > 30 – 32% > 72 hr</p>	3	2	4	24	<p>Organization of the harvests. Management of the time periods between collection and drying. Rotation of hoppers or pre-storage areas (FIFO – First In First Out principle). Management of the dryers. Raise contractors', farmers' and employees' awareness on the harvest time.</p>

G severity index
F frequency of appearance index
D detection index
R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **PRE-STORAGE AND DRYING**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Insects</u>	No conceivable cause					
<u>Residues from storage pesticides</u>	No conceivable cause					

G severity index

F frequency of appearance index

D detection index

R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **DRYING**

Product Oilseeds						
Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Moulds</u>	Equipment / Method: Poor operation of the dryer Discontinuous operation of the dryer	1	2	3	6	Maintenance of the dryer. Management of the dryers. Awareness raising/training for staff in operating a dryer.
<u>Mycotoxins</u>	Equipment / Method: Poor operation of the dryer Discontinuous operation of the dryer	3	1	4	12	Maintenance of the dryer. Management of the dryers. Awareness raising/training for staff in operating a dryer. Control the humidity of the goods.
Dioxins	direct drying can pose a significant risk to feed (and food) safety in regard to dioxins when improper fuel is used in the process or due to poor maintenance of the dryer).	3	2	4	24	Maintenance of the dryer.. check leakage of heat exchanger Management of the dryers. Awareness raising/training for staff in operating a dryer.- Forbid use of "dangerous" fuels such as used engines lubricants, pyralene, treated woods, ect.. and favour use of natural gaz when possible

G severity index
 F frequency of appearance index
 D detection index
 R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **STORAGE**

Product Oilseeds						
Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
Moulds	<u>Equipment:</u> Unloading points too high (broken grains) Poor bin sealing (infiltration of water) Ineffective ventilation (performance of the ventilator, height of the bins, extraction) Insufficiently clean bins Dryeration bins not isolated from the other bins Lack of thermometry	1	2	3	6	Maintenance – Cleaning of the bins – Cleaning of the silo / pesticide treatment. Good storage design. Staff training. Cleaning of the grains - Projected storage plan Storage management: temperature reading – ventilation method Visual control
	<u>Method:</u> Poor bin rotation Ineffective cleaning of the grains Lack of or unsuitable ventilation Mixing of goods Damp raw material	1	2	3	6	
Mycotoxins (<i>Ochratoxin A</i>)	<u>Equipment:</u> Unloading points too high (broken grains) Poor bin sealing (infiltration of water) Ineffective ventilation (performance of the ventilator, height of the bins, extraction) Insufficiently clean bins Dryeration bins not isolated from the other bins Lack of thermometry Damp raw material	3	2	4	24	Staff training. Cleaning of the grains - Projected storage plan Storage management: temperature reading – ventilation method
	<u>Method:</u> Poor bin rotation Ineffective cleaning of the grains Lack of or unsuitable ventilation Mixing of goods	3	2	4	24	

G severity index
 F frequency of appearance index
 D detection index
 R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **STORAGE**

Product Oilseeds						
Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
Insects	Equipment infested (bin and handling equipment) or faulty (thermometry, ventilator). Cereals Oilseeds	1	2	2	4	Cleaning and pesticide treatment if required of the storage bins and handling equipment. Control of the equipment's correct operation (thermometry, ventilator).
		1	1	2	2	
	Environment: Temperature and humidity conditions favouring the proliferation of the insects. Cereals Oilseeds	1	2	2	4	Temperature control. Visual control
		1	1	2	2	
	Method/labour (absence of or poor ventilation, long storage duration): Cereals Oilseeds	1	2	2	4	Train silo staff in storage methods. Operating methods adapted to the silo facilities (example: ventilation operating method).
		1	1	2	2	

G severity index

F frequency of appearance index

D detection index

R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **PESTICIDE TREATMENT**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Residues from storage pesticides</u>	Contamination of the goods by a leak in the pesticide treatment equipment. Contamination of the goods by the circuits and/or bins.	3	1	4	12	Maintenance and verification of the pesticide treatment equipment. Control of the drum levels. If possible, dedicate the circuits for oilseeds goods or drain the circuits.
	Method Poor regulation of the equipment, grain flow variation, multiple treatments leading to an overdose, waiting time necessary after treatment and before use of the goods is insufficient. <i>Product not approved for oilseeds</i>	3	2	4	24	Operating method/train staff in pesticide treatment methods, the product choices and the dose applied. Increase staff awareness (silo, production, drivers, boat men etc.) on complying with waiting times after treatment of the goods and before their use. Servo-control for the elevator's functioning, Monitoring / recording Periodic maintenance and control of the treatment equipment Periodic verification of the handling equipment's flow.
<u>Insects</u>	Method (unsuitable treatment, underdosage).	1	2	2	4	Monitoring / recording Periodic maintenance and control of the treatment equipment Periodic verification of the handling equipment's flow. Operating method/train staff in pesticide treatment methods, the product choices and the dose applied. Servo-control for the elevator's functioning.

GOOD HYGIENE PRACTICES GUIDE

Stage: **PREPARATION – COMMERCIAL CONTRACT**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Moulds</u>	Accidental mixing of goods with non-compliant raw materials.	1	1	3	3	Cleaning / Identification of the batches.
<u>Mycotoxins</u>	Accidental mixing of goods with non-compliant raw materials.	3	1	4	12	Identification of the batches / Cleaning.
Insects	Contamination during mixing by an infested good.	1	2	2	4	Identification of the contaminated batches. Sampling control
	Infested equipment (handling equipment, bins or hoppers, size grading machine, cleaner - separator).	1	1	2	2	Cleaning and pesticide treatment of equipment, if required.

G severity index

F frequency of appearance index

D detection index

R risk or criticality = G * F * D

GOOD HYGIENE PRACTICES GUIDE

Stage: **DISPATCH - DELIVERY**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Moulds</u>	Wet goods loaded:					
	<ul style="list-style-type: none"> Because loaded in the rain (unprotected loading) 	1	2	1	2	Instructions to stop loading in bad weather or to protect the goods.
	<ul style="list-style-type: none"> Because goods were wet when loaded 	1	2	1	2	Goods inspections: humidity, visual, smell. Limit the transport time.
	Cleaning difficult due to the equipment's design.	1	2	2	4	Raise staff awareness on cleaning and inspections (driver, boat man, silo operator etc.).
	The container has a faulty seal					Specifications with the transport service providers requiring cleaning of the transport equipment.
	Container remains wet after cleaning.	1	2	3	6	Inspections: visual, smell, documentary.
	Rotting residue from the previous transport:	1	1	1	1	Maintenance of the transport equipment.
<ul style="list-style-type: none"> Lorry / Barge Train 	1	1	1	2		
		1	2	3	6	
Loaded carriage of undried goods: duration too long (barge / wagon).						
Duration > 72 hr (e.g. for maize with a humidity level > 30-32%)	1	2	3	6	Raise the transporter's awareness on transport times.	

GOOD HYGIENE PRACTICES GUIDE

Stage: **DISPATCH - DELIVERY**

Product Oilseeds						
Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Mycotoxins</u> <i>Fumonisin</i> , <i>DON</i> , <i>Zearalenone</i> , <i>Ochratoxin A</i>	Wet goods loaded:					Instructions to stop loading in bad weather Goods inspections: humidity, visual, smell – Limit the transport time. Raise staff awareness on cleaning and inspections (driver, boat man, silo operator etc.). Specifications with the transport service providers requiring cleaning of the transport equipment. Inspections: visual, smell, documentary. Maintenance of the transport equipment. Raise the transporter's awareness on transport times.
	<ul style="list-style-type: none"> Because loaded in the rain (unprotected loading) 	3	1	4	12	
	<ul style="list-style-type: none"> Because goods were wet when loaded 	3	1	4	12	
	Cleaning difficult due to the equipment's design.	3	1	4	12	
	The container has a faulty seal	3	1	4	12	
	Container remains wet after cleaning.	3	1	4	12	
	Rotting residue from the previous transport:	3	1	4	12	
	<ul style="list-style-type: none"> Lorry / Barge 	3	1	4	12	
	<ul style="list-style-type: none"> Train 	3	2	4	24	
	Loaded carriage of undried goods: duration too long (barge / wagon).					
<ul style="list-style-type: none"> Duration > 72 hr (e.g. for maize with a humidity level > 30-32%) 	3	1	4	12		

GOOD HYGIENE PRACTICES GUIDE

Stage: **DISPATCH - DELIVERY**

Product Oilseeds

Hazard	Causes of the hazard	Hazard analysis				Recommended preventive measures
		G	F	D	R	
<u>Insects</u>	Infested goods	1	2	2	4	Good storage practices.
	Infested handling equipment.	1	2	3	6	Cleaning and pesticide treatment of handling equipment, if required.
	Infested vehicle: <ul style="list-style-type: none"> • Container design which favours residues (lorries: moving bases, locks, tyres, tarpaulin; boat: floor, hatches, wooden panels; train: hatches, corners of the wagon) • Container contaminated by a previous transport – residue from contaminated goods: 	1	2	3	6	Specifications with the transporters with a requirement to avoid using certain containers.
		1	2	3	6	Control of the container: visual, smell, documents – Verification that this control has been carried out by the approver. Specifications with the transporters with a requirement regarding the vehicle's cleanliness. Cleaning of his/her vehicle by the storage organization.
	Poor cleaning – lack of staff controls	1	1	3	3	Increase staff awareness (silo, drivers) on cleanliness and vehicle cleaning.
	Loaded carriage: duration too long (barge / wagon).	1	1	3	3	Increase the transporter's awareness on transport times – preventive treatment of the batch.

G severity index
D detection index

F frequency of appearance index
R risk or criticality = G * F * D

ACRONYMS AND ABBREVIATIONS

- **AFNOR** (Association française de normalisation / French Standards Association)
- **AFSSA** (Agence française de sécurité sanitaire des aliments / French Food Safety Authority) : created by law no. 98-535 of 01 July 1998, OJ of 02/07/1998, the new Agency is mainly responsible for assessing the sanitary and nutritional risks that may be present in foods intended for humans or animals, including water intended for human consumption.
- **ARVALIS-Institut du végétal / Plant Institute** Technical centre for research and development of cereal production procedures in France, merger of the ITCF and the AGPM (Association Générale des Producteurs de Maïs / General Association of Maize Growers) Technique.
- **CETIOM** (Centre Technique Interprofessionnel des Oléagineux Métropolitains / Technical Centre for Oilseeds Crops) Technical centre for research and development of oilseeds production procedures in France.
- **COCERAL** (Comité du Commerce des céréales, aliments du bétail, oléagineux, huile d'olive, huiles et graisses et agrofournitures)
- **Codex Alimentarius** FAO (Food and Agriculture Organisation) / WHO (World Health Organization) joint committee, the Codex Alimentarius Commission whose aim is to create standards to protect consumer safety and ensure fair practices in the foodstuff trade, these standards are used as a reference by the World Trade Organization (WTO) when assessing the extent to which the national regulations and their methods of application are an excessive hindrance.
- **Coop de France - Métiers du Grain** (French Agricultural Cooperative Union for Collection, Supply and Processing)
- **COPA-COGECA** (European Farmers And European Agri-Cooperatives)
- **FNA** (Fédération du Négoce Agricole / Union of Agro-Businesses)
- **ISO** (International Organization for Standardization)
- **ITCF** (Institut Technique des Céréales et des Fourrages / Technical Institute for Cereals and Forage)
- **ONIGC** (Office National Interprofessionnel des Grandes Cultures / National Interprofessional Office for Crops)
- **ONIDOL** (Organisation Nationale Interprofessionnelle des Oléagineux / National Oilseeds Interprofessional Organization)
- **SYNACOMEX** (Syndicat National du Commerce Extérieur des Céréales)
- **UNIP** (Union Nationale Interprofessionnelle des Plantes Riches en Protéines / National Protein crops Interprofessional Union)

APPENDIX 7

REGULATORY REFERENCES & BIBLIOGRAPHY

REGULATORY REFERENCES

European legislative and non legislative references

HYGIENE / FOOD LEGISLATION

- Council Regulation (EEC) no. 315/93, of 8 February 1993, laying down Community procedures for contaminants in food.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993R0315:EN:HTML>
- Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001R0999:EN:HTML>
- Regulation (EC) no. 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002R0178:EN:HTML>
- Regulation (EEC) no. 852/2004 of the European Parliament and of the Council of 29 April 2004, on the hygiene of foodstuffs.
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:226:0003:01_REG_2004_852_21:EN:HTML
- Regulation (EEC) no. 882/2004 of the European Parliament and of the Council of 29 April 2004, on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.
[http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R0882R\(01\):EN:HTML](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R0882R(01):EN:HTML)
- Regulation (EEC) no. 183/2005 of the European Parliament and of the Council of 12 January 2005, laying down requirements for feed hygiene.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005R0183:EN:HTML>

CONTAMINANTS IN HUMAN FOOD

- Commission Regulation (EC) No. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs [Heavy metals and Mycotoxins in particular].
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:364:0005:01:EN:HTML>
- Commission Recommendation of 17 August 2006 N° 20 06/576/EC on the prevention and reduction of Fusarium toxins in cereals and cereal products.
http://eur-lex.europa.eu/LexUriServ/site/fr/oj/2006/l_234/l_23420060829fr00350040.pdf

UNDESIRABLE SUBSTANCES AND PRODUCTS IN ANIMAL FEED

- Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0032:EN:HTML>
- Commission Recommendation of 17 August 2006 on the presence of deoxynivalenol, zearalenone, ochratoxin A, T-2 and HT-2 and fumonisins in products intended for animal feeding.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:229:0007:01:EN:HTML>

PESTICIDE RESIDUES

- Regulation (EC) No. 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005R0396:EN:HTML>

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APPENDIX 8

TRANSPORT

TRANSPORT:

Procedures for cleaning and categorising products

This appendix proposes a categorization procedure for bulk products transported by land, sea or river, based on the risk levels they present for the subsequent load.

It also defines the required cleaning levels according to the nature of the previous load and describes the procedure to be followed to reallocate and validate containers that have transported “very high-risk” products in the previous load.

On this basis the operator can:

- Verify the risk category of the products transported during the previous load
- And ensure that appropriate cleaning and/or washing and/or disinfection procedures are applied to bring the risks of contamination to an acceptable level.

Any packed and/or packaged product can be transported in accordance with current regulations.

1. Definition of the different cleaning procedure levels

Level A: Dry cleaning

This level is generally used after “neutral” products have been transported and mainly consists of operations such as suction, blowing and sweeping, sometimes followed by manual cleaning of hard to reach areas if necessary. Any parts that are still dirty after dry cleaning can be cleaned locally using a wet process.

Level B: Cleaning with clean water

It is often necessary to clean with water after wet or viscous products or products with a potential chemical risk have been transported. It should be done following the steps described below if possible:

- Remove all residues from the previous load from the compartment, without using water if possible
- Rinse with clean cold water or, if necessary hot water
+ clean hard to reach areas manually
- If necessary, clean with a jet washer
- Dry

Level C: Cleaning with water + detergent

Cleaning level C (with detergents) is often needed after greasy products or products containing proteins have been transported. It should be done following the steps below if possible:

- Remove all residues from the previous load from the compartment, without using water if possible
- Rinse with clean hot water (temperature depends on the compartment and detergent used) + manually clean hard to reach areas
- Apply detergent(s)
- Rinse with hot water
- Dry

Level D: Disinfection after level A, B or C cleaning

Level D cleaning must be applied if products have previously been transported that are microbiologically unacceptable or have been identified as carrying microorganisms that are considered dangerous at levels higher than those stated in the regulatory requirements. The steps to follow are briefly described below:

- Level A, B or C cleaning
- Disinfect with a disinfectant authorised for food use (using the manufacturer's recommended doses and application instructions)
- Rinse with water
- Dry

Level E: Requalification procedure for a loading compartment that has transported category LR1 products.

Procedure E must be used in order for a compartment that has contained category LR1 products in the last load to be approved for use.

This procedure authorizes/reauthorizes for use a compartment/means of transport that has contained or transported Category LR1 products during the last journey.

The procedure to follow is set out below:

- a) Level B, C or D cleaning depending on the kind of LR1 product previously transported, based on a risk assessment carried out by the operator.
- b) Have the compartment/means of transport inspected by a qualified person who will check that the cleaning operations recorded in the registers have actually been carried out and will certify the results based on a thorough visual inspection. Depending on the kind of products previously transported, additional tests and analyses (microbiological and/or chemical) may be conducted based on sampling and analysis protocols appropriate to the hazards detected.
- c) A declaration/certificate is issued by the qualified person confirming that the compartment/means of transport is fit to transport products for human or animal consumption.

2. General provisions relating to level B, C, D and E cleaning of containers by the operator

- Detergents and disinfectants must be used according to the recommendations provided in the product manufacturer's instructions.
- A sufficient number of copies of the documents confirming that cleaning operations have been carried out must be kept and must contain at least the following information:
 - Identification of the means of transport
 - Date and place where cleaning took place
 - Type of product transported justifying the cleaning level used
 - Type of cleaning applied.

3. Categorising products transported in bulk

General principles

Each product transported must be categorised based on the type and severity of the risk it presents. The transport conditions and cleaning sequences must be adapted to the risk level presented. For class LR1 products, the loading compartment cannot be used until the necessary cleaning procedures determined by the risk analysis have been carried out by the operator.

Category LR1 – Very high-risk products

Non-exhaustive list (such as, without limitation)

Type of Products	Example
Animal faeces	Slurry, manure, droppings etc.
Other (inorganic substances)	Asbestos, asphalt, gas, petroleum, mineral clay used for detoxification, petroleum cokes, mineral oils, radioactive material, active carbon used. Toxic oxidant materials, metal shavings and turnings (not degreased, not washed and not dried)
Other (organic substances)	Domestic waste, untreated food residues, sewage sludge, unpackaged grains treated with toxic substances
Products of animal origin banned in feed for production animals	Treated and untreated materials from Category 1 or 2 (see Regulation (EC) No. 1774/2002) etc.

Category LR2 – Microbiologically contaminated products

Non-exhaustive list (such as, without limitation)

Type of Products	Example
Other (inorganic substances)	Dirty glass etc.
Other (organic substances)	Organic compost, organic fertilizer, material contaminated by salmonella or other pathogens, materials that have perceptible signs of deterioration etc.
Products of animal origin authorized for use in feed for production animals, excluding dairy and egg products	Animal and marine animal fats and oils etc.

Category LR3 – Products with a chemical and/or physical risk

Non-exhaustive list (such as, without limitation)

Type of Products	Example
Chemical fertilizers and liquid minerals	Nitrogen solutions etc.
Products containing soil	Green compost, garden soil, soil-based compost, heath earth
Additives	All additives included in the list of additives approved by the EU (transported in bulk in accordance with Regulation (EC) No. 1831/2003)
Solid mineral combustible fuel oil	Anthracite, bituminous coal, black coal, cokes etc.
Other substances/products (inorganic)	Construction and demolition waste, miscellaneous chemical products, clean glass, metal shavings and turnings, residues, (copper, brass, aluminium) etc.
Other substances/products (organic)	Miscellaneous organic substances (alcohols, acids, wax, vegetable and hydrogenated oil and fat, fatty acid esters, grape derivatives, white mineral oil, acid oils and fatty acid distillates etc.)

Category LR4 – Neutral products

Non-exhaustive list (such as, without limitation)

Type of Products	Example
Products or raw materials intended for human food	Products or raw materials for human food, such as grains, oilseeds, protein crops and their by-products
Raw materials intended for the production of animal feed and animal feed of mineral or plant origin	Products or raw materials for animal feed, such as grains, oilseeds, protein crops and their co-products, sugar beet pulp, lucerne etc. Sodium chloride (salt) Feed for animals
Raw materials of animal origin intended for the production of feed for production animals and foods containing them	Milk and dairy products, egg products etc.
Foods for animals containing animal proteins (excluding dairy and egg products)	Animal feed with fish meal, dibasic calcium phosphate, tribasic calcium phosphate of animal origin and blood products from non-ruminants, if the following load is made up of animal feed for non-ruminants (in accordance with Regulation (EC) 999/2001/EC)
Chemical fertilizers and solid minerals	Ammonium sulphates, potassium sulphate, urea, calcium etc.
Pre-packed and/or packaged products	Packaged agricultural supplies, pallets, Big Bag, additives in solid/dry form etc.
Products containing soil	Garden peat, garden compost/soil (treated with artificial fertilizers)
Minerals	Granite, mining stone etc.
Other substances/products (organic)	Miscellaneous silicates, gravel, pebbles, clinker, synthetic materials, mortar, cement, gypsum, ethanol, vermiculite, talc, tree bark, grasses, wood shavings, coffee husk, (waste) paper etc.

4. Recommended sequences for transport, cleaning and disinfection

Product category	Products in the previous load (N-1)		Products to be loaded (N)
	Category of the product transported in N-1	Condition of the compartment before loading the bulk product	Cleaning sequence to be followed + instructions
LR1	Very high-risk products	n.a. (not applicable)	Transport not authorized (unless procedure E is applied)
LR2	Microbiologically contaminated products (p.e. salmonella, putrefaction etc.)	Cleaning after unloading	A+D
		Residues remaining after dry cleaning	B+D
		Residues (odour) after cleaning with water	C+D
LR3	Products representing a physical or chemical risk	Clean after unloading	B
		Residues (odour) after cleaning with water	C
LR4	Neutral products	Clean after unloading	A
		Residues remaining after dry cleaning	B
		Residues (odour) after cleaning with water	C

Particular case of precedents concerning the transport of animal products:

Regardless of the category to which they belong (LR1, LR2, LR3 or LR4), it is important to ensure that, in addition to the rules described in the above table, the transport complies with the national and community rules specific to the transport of these products (Regulation (EC) No. 1774/2002 and (EC) No. 999/2001 in particular).